AMERICAN

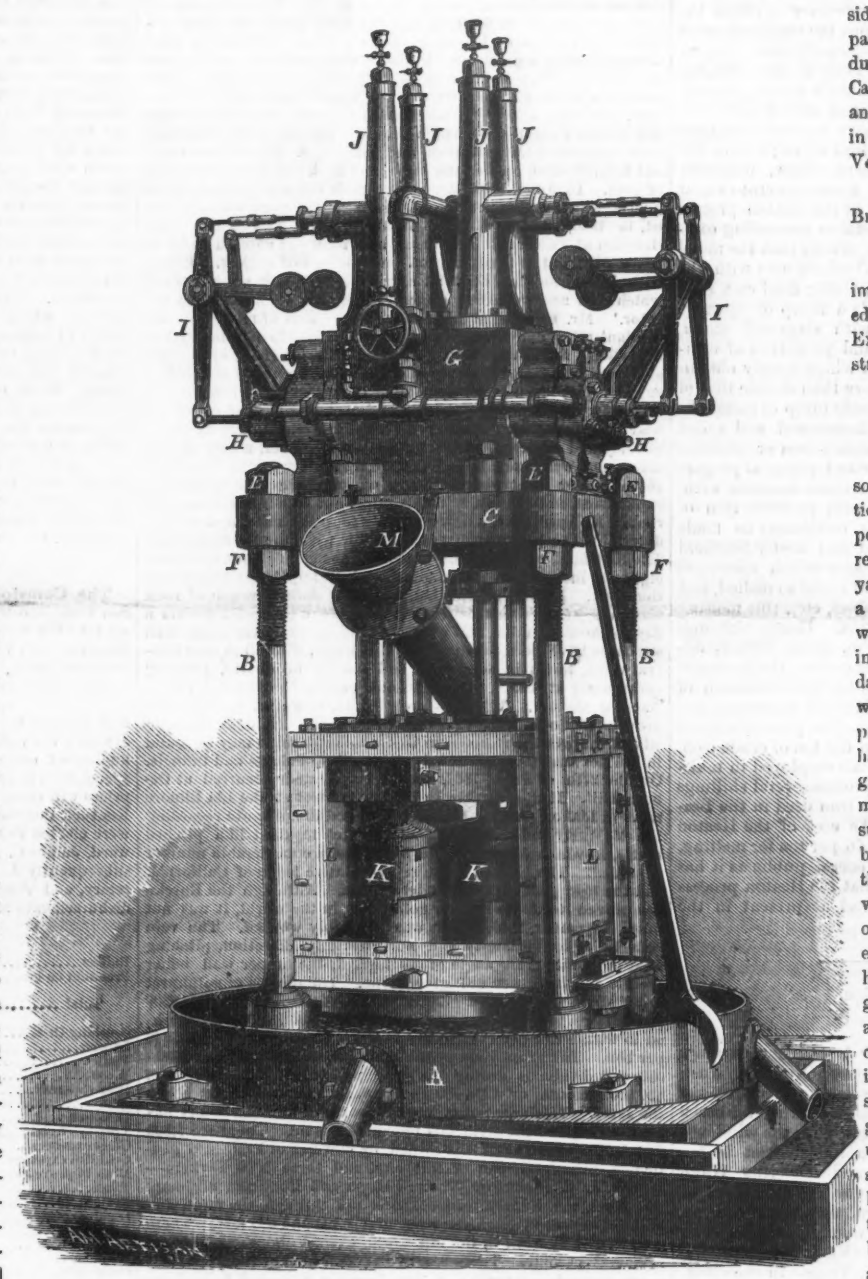
Journal of Mining,

Engineering, Geology, Mineralogy, Metallurgy, Chemistry, etc.

VOLUME VI—Number 26. New Series. | NEW YORK, DECEMBER 26, 1868. | $4 A Year in Advance. Single Copies Ten Cents.

IMPROVED STEAM STAMP MILL.

About two years ago attention was called to this stamp mill, by engraving and description in the AMERICAN JOURNAL OF MINING, since which time it has been greatly improved. Among the defects was the smallness of the amalgamating pan, and this has been enlarged to a sufficient capacity. The machine stands within a horizontal ar ea only six feet, and the manufacturers claim that it is capable of doing as much work as thirty stamps driven by a shaft in the usual way, and occupying about ten times the room; it can be fed by one man, while several would be required to feed the thirty stamps. It is thus described: The stamps, K, K, which are attached directly to steam piston-rods, are arranged in a group four in number, and surrounded by a screen, L, the front of which is omitted, to expose the stamps to view. The battery in which the stamps work is surrounded by a trough, A, cast in the bed-plate of the mill. The ore to be crushed is fed in through a hopper, M, directly into the centre of the group of stamps, and so distributed equally to all, and as fast as it is pulverized finely enough it is delivered on all sides through the screen into the trough, A. The stamping is done wet, and the very finest portion of the powder is washed over from the trough, A, by the overflow of water through spouts into an outer surrounding trough or gutter. There is a separate steam cylinder and piston for each stamp. The cylinders are all cast together with a surrounding exhaust steam-jacket G, and sole plate, C, and are supported on wrought-iron pillars, B, B, erected upon the bed-plate, A; and all the cylinders can be adjusted simultaneously by means of nuts, E, F, fitted to screw-threads on the pillars, for the purpose of adjusting the clearance between the pistons and the top and bottom of the cylinder, and for maintaining a uniform clearance by lowering the cylinders as the stamps wear away and allow the pistons to descend lower. The steam acts above and below the pistons, so that it not only lifts the stamps, but the force of its downward pressure on the piston is added to that due to the weight and fall of the stamps. Each cylinder has an independent valve and automatic valve-gear, so that each piston and stamp may work independently of all the others. The valves are short double-faced slides, working horizontally in the chests, H, and operated partly by the steam and partly by conical surfaces on the upper parts of the piston and stamp rods, which pass upward beyond the tops of the steam cylinders into closed central caps, J, J, on the cylinder covers. The conical parts of the rod act through levers, I, I, and attached slides. This method of operating the valves permits the stamps and pistons to turn freely as required. The cylinders are 5 1-2 inches in diameter, and the pistons have from six to eight inches stroke, according to the depth of material in the battery. The machine is estimated at about thirty horse power, and will crush thirty tons of hard ore in twenty-four hours. These stamp mills have been introduced to some extent, and some very flattering reports have been received as to their efficacy, one or twe of which are appended.



IMPROVED STEAM STAMP MILL.

SMITH'S FORD, YORK DIST., S. C., April 11, 1868.

MR. A. COSGRIFF—Dear Sir: I had the pleasure to-day of seeing for the first time your steam stamp mill in operation, and I think as for the amount of work done in the time was there, it excels any mill I have ever seen, not only crushing the hardest quartz I ever saw, but doing it easily and fast. I saw two hundred and fifty pounds of ore weighed, and with only sixty pounds of steam on the boiler, it was crushed in seven (7) minutes, and I doubt if there is a Thirty Stamp in the United States that can do the same to the same ore in the same time. It amalgamates splendidly, saving almost all the gold upon the first copper, showing conclusively to my mind that it plates the gold with quicksilver inside the battery. There can be no doubt of the success of the mine if proper care is taken in selecting the ore, although I think the mill is now running on the poorest ore on the property. It will only be though poor management (errata *poor management*) if it does not pay well. I am agreeably disappointed in the working of the Mill, as I expected to see a partial failure at least. With kindest regard, I remain yours truly, C. C. BAKER, Mining Engineer.

TO THE OWNERS OF THE N. Y. STEAM ENGINE CO.'S STEAM STAMP BATTERY—Sirs: At the request of Mr. Cosgriff, your agent here, I give briefly my opinion of your Mill. I have been on the ground over two weeks, during which time it has been in steady operation; its capacity is ample to satisfy any reasonable person having knowledge of the business, and the results obtained from other methods of reducing. I should rate its capacity equal to a Twenty Stamp Combe Battery, of six hundred and fifty (650), each with this advantage, with an increased ratio according to hardness and gravity of material being reduced. The amount of work a Combe Battery can do will vary from one-third to one, according to character of material. As an amalgamator it is the best I have ever operated with. No impediment exists to using such appliances for amalgamating as one may choose to use. The shoes and dies wear even, and much less than in the old style battery; this is one of the peculiar features of the lively blow obtained from the direct action of steam pressure. I consider it reasonably durable in its parts, those parts at all subject to wear can be easily duplicated in any small country shop. Can say I would choose in preference to anything I know of, were I embarking in a mining enterprise on my own capital.

Very respectfully yours,

AARON L. MOSEBY, Mining Engineer.

Broad River Mine, York District, S. C., April 15th, 1868

Any further information in regard to this improved steam Stamp Mill, can be obtained by addressing the NEW YORK STEAM ENGINE CO., Nos. 126 and 128 Chambers street, New York City.

Gun-Cotton for Blasting Purposes.

It is satisfactory to find that almost the sole remaining obstacle to the general adoption of gun-cotton as a substitute for gunpowder in blasting operations has now been removed, Mr. Abel, of the Woolwich Dockyard Chemical Department, having invented a new primer for the ignition of gun-cotton, which renders that article equal in shattering power to nitro-glycerine, whilst the danger inseparable from nitro-glycerine, whatever may be the form in which it is prepared, is altogether absent. Mr. Abel has discovered that the explosive force of gun-cotton, like that of nitro-glycerine, may be developed by the exposure of the substance to the sudden concussion produced by a detonation, and that if exploded by that agency the suddenness and consequent violence of its action greatly exceeds that of its explosion by means of a highly heated body of flame. Some remarkable results have already been obtained by exploding gun-cotton with a fuse, to which is attached a small detonating charge. Large blocks of granite, and other very hard rock, and iron plates of some thickness, have been shattered by exploding small charges of gun-cotton which simply rested upon their upper surfaces—an effect which will be sufficiently surprising to those who have hitherto believed, as every one has believed, that unconfined gun-cotton was scarcely to be considered as explosive at all. Mining and quarrying operations, with gun-cotton applied in the new manner, have furnished results which have hitherto proved quite equal to those which were obtained with nitro-glycerine, and have shown conclusively that if gun-cotton is exploded by detonation, it is unnecessary to confine the charge in the blast-hole by the process of hard tamping, as the explosion of the entire charge takes place too suddenly for its effects to be appreciably diminished by the line of escape presented by the blast-hole. Thus the most dangerous of all operations connected with mining may be dispensed with when gun-cotton, fired by the new system, is employed. It is considered that this discovery can hardly fail to give a great impetus to gun-cotton, and to lead to its universal adoption as soon as its enormous power, when used with the new detonating fuse, becomes known.—*London Mining Jour.*

The Heaton Steel Process.

Mr. H. Bessemer writes to the London *Times* in reference to a recent paragraph which said that whereas the Bessemer

in use for the past two years on all kinds of work, and in all parts of the country, and are the most economical and durable in the market. Suitable for prices and information either plain or dye work. For where Hammers can be seen, address PHILIP S. JUSTICE, 49 Cliff Street, N. Y., and 14 North Fifth Street, Philadelphia. sept5:6mos

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process demands iron of the first brand, and is unequal to the conversion of iron of inferior qualities charged with impurities of phosphorus and sulphur in large quantities, by the Heaton process inferior iron is made into first-class steel. Mr. Bessemer says: "The inference which I find has been in many cases drawn from this paragraph is simply that Mr. Heaton can by his process produce, from a cheap and inferior pig-iron, steel of a similar character to that obtained from a more expensive raw material by the Bessemer process. This is, however, far from being the case, for Bessemer steel is cast steel—that is, steel made into a perfectly homogenous mass while in a fluid state—and to that circumstance alone owes its great value as a material for the manufacture of railway bars, etc. All cast steel, however it may be made, possesses this invaluable property of homogenity and freedom from a laminated structure, and none other than cast steel has this peculiar property. It must also be borne in mind that the reason why a Bessemer steel rail is found to last out from ten to a dozen ordinary iron rails is not in consequence of its hardness as steel, but because it owes its great durability to its entire freedom from that laminated or fibrous character common to all iron or steel which becomes mechanically mixed with slags or scoria in consequence of the solidification of the metal while its refinement is still going on, as is the case in the Heaton process, which cannot produce cast steel. In the Bessemer process, by simply forcing atmospheric air in numerous jets upwaad through five tons of molten pig iron for a period of 15 or 20 minutes, the iron is converted into fluid cast steel; the oxygen contained in the air, uniting with the superfluous quantity of carbon present in the pig iron, produces an intense combustion and raises the temperature of the metal to the extremely high point necessary to retain the steel in a state of complete fusion, without the employment of any additional fuel; the fluid thus obtained, when poured into moulds, forms a solid homogenous mass of cast steel, entirely free from scoria or other mechanically mixed impurities. But in the Heaton process nitrate of soda mixed with sand is employed to generate the necessary amount of oxygen gas for decarburizing the pig iron, instead of employing the cheap gasous oxygen of the atmosphere. Now, whenever solid substances are converted into gas, a vast amount of heat is absorbed and rendered latent; hence in the Heaton process so much heat is abstracted from the metal in generating oxygen gas by the decomposition of nitrate of soda that the metal solidifies while in a state of mechanical admixtures with the sand and soda, and thus, instead of obtaining fluid cast steel by his process, Mr. Heaton obtains only a lump of spongy, porous metal, intermixed throughout with slags and scoria, and having the general characteristics and properties of ordinary puddled iron or puddled steel, but which is only obtained at a cost (for nitrate of soda) of more than double that of the ordinary puddling process. The crude lump of metal obtained by the nitrate process may be hammered and rolled into bars, and be used as ordinary puddled iron or puddled steel, materials which from their nature and physical properties are entirely distinct from, and can never compete with, cast steel. It is true that, in common with puddled iron of every description, Mr. Heaton's crude metal may be made into cast steel by resorting to the old and costly Sheffield process of melting in crucibles, a process which consumes about 3 1-2 tons of coke for every ton of metal so melted, and with the additional cost of wages, crucibles, etc., this melting process alone costs from £5 to £6 per ton. Hence, although Mr. Heaton starts with a cheap pig iron, giving him an advantage of 20s. to 30s. per ton over the cost of the Bessemer raw material, he nevertheless employs for the conversion of one ton of pig iron (according to Dr. Millar's report) no less than 270lbs. of nitrate of soda, which, at the present market price of 15s. per cwt. is equal to 36s. on the ton of crude iron, thus bringing up the cost of the materials employed in making a ton of crude steel by the Heaton process several shillings per ton above the cost of the high-class iron used in the Bessemer process; and when we add to the cost of the Heaton crude steel the additional cost of £5 to £6 per ton for melting, I think it will become as clear to the general public as it has long been to all practical steelmakers that the Heaton process can in no way compete with the cast steel at present in the market, either in price or quality."

Lightning in a Mine.

The London *Mining Journal* says: "A strange occurrence is related as having occurred at Carnyorth Mine, St. Just, during an awful thunder storm. The lightning struck the engine-house, cleaving the spring-beam, a balk of timber 9 inches square, knocking the stair to pieces, with the windows, roof, and stack. The fluid went down the shaft at 50 fathoms, striking H. Boyns in the arm and rendering Hugh Laynon speechless. They thought a gun had been fired at them. On finding the arm not broken they proceeded up with great difficulty. The lightning went down altogether 300 fathoms, and run along the tram-road 300 fathoms more, striking R. Angwin in the foot, and W. Tresise in the chest. All the men under ground received a severe electric shock. The ozone was suffocating. No death occurred, nor injury to the iron work of the engine. A man called Archer, working at the stamp engine, was knocked backwards, and the arms of the round buddle machine were knocked away."

Patent Claims.

Interesting to Miners, Millmen, Metallurgists, Oil-Men, and Others.

84,749.—COAL CHUTE.—Henry Merriman, Bloomington, Ill.:

I claim the inner weighted apron, C, having the loose catch-rods, g, and pivoted at its lower edge to the chute and the outer weighted apron, D, also pivoted at its lower edge and provided with the lugs, o o, all operating as described; whereby, as the outer apron is swung down to form a spout, the lugs, o o, release the rods, g, from the catches, e, and permit the inner apron to open the chute for the discharge of coal, substantially as herein shown and described.

84,883.—ROCK DRILL.—Michael Keefer, Millstone Point, Md.:

I claim, 1st, The combination of the adjustable rod, I, spring, J, and drill-shaft, E, with suitable guides for the drill, substantially in the manner and for the purpose described.

2d, The cross-pieces, D and F, with the oblique holes, in combination with the drill and spring, thus operating substantially as shown and described.

Mining Summary.

GOLD AND SILVER.

California.

THE GRASS VALLEY MINES—INTERESTING REMINISCENCES.

The California correspondent of the N. Y. *Times*, in a review of the history of Grass Valley, in Nevada County, thus speaks of its mines: "As in all mining localities, there are hundreds of claims and ledges; but the principal leads are the Eureka, Massachusetts Hill, Boston, Ravine Flat, New York Hill, Wisconsin Flat, Missouri Hill, Lafayette, Allison, Norambaynu, Gold Hill, Union, Howard, Opoir, Hueston, North Star, Osborn, Lone Jack and Diamond. There are twenty-two stamp-mills in the city—the Allison mill, eight stamps—not in operation; the Byen, eight stamps—not in operation; the Cambridge, ten stamps—not in operation; the Coe, with new crushing process—not in operation; the Eureka, one of the best mills in California, thirty stamps—always in operation, day and night, Sundays included; the Empire, the most elaborately-finished, and one of the most successful in the State, forty stamps—in operation; the Gold Hill twenty stamps—in operation; the Larrimer, nine stamps; the Saton, eight stamps; the Lucky, fifteen stamps; the North Star, twenty stamps; the Perrins five stamps; the Sebastopol, 12 stamps; the Smith and Nortbey, eight stamps, and the Union, twenty stamps—all in operation. There are also the Hartery, eight stamps; the Ione, ten stamps; Lady Franklin, eight stamps; Merrimack, ten stamps; Norambaynu, ten stamps; Osborn, fifteen stamps; and the Stockton, another mill—none of which are at present in operation. The mines are all good that have been worked, and the mills not in operation are either the victims of litigation or the process of 'freezing out.' There is hardly a great mine in Grass Valley without an interesting history. The Massachusetts Hill sketch I will relate. This mine was worked at an early day, but with a small degree of success. In 1851, a New Yorker, named Delavan, worked the mine and put up a small mill, which proved a failure. A Mr. Whitney soon succeeded Mr. Delavan, and failed. A Mr. Seyton came out from Boston, opened the mine, and took out a large quantity of gold. In June, 1855, Mr. Seyton took out a large quantity of quartz, which averaged $70 to the ton. Mr. Seyton was succeeded, in 1856, by Mr. Malachi Brennan, from New York. Mr. Brennan at once sunk a stringer, and took out enough gold to pay a dividend of two per cent. on a million of dollars. Elated with his success he built an extensive mill, and sunk a shaft which cost nearly $40,000, during which time he never 'saw the color.' Mr. Brennan had borrowed large sums of money, at exorbitant rates, and kept on sinking until friends and money had departed. Being unable to go further with his shaft, he became aberrated and killed his wife and three children and committed suicide. He left a letter explaining the cause of his terrible act, describing in detail his bad luck, and asserting that he could not bear the thought of leaving his wife and little ones to buffet poverty and disgrace. Brennan was an Irishman, a man of erudition, and was at one time, I believe, a reporter on the New York *Herald*. For eight years, off and on, one company or another sunk shafts and run levels in this mine, but failed to find any pay rock. In April, 1864, a new company took the mine, and at once determined to go down 100 feet further with the Brennan shaft. The first blast put in at the botton of the shaft struck the ledge eighteen inches from where Brennan had hopelessly abandoned the work. In two months half a million dollars' worth of rock was in sight. From that time it has cost a thousand dollars a day to work the mine, and over two millions of dollars clear of all expenses have been taken out. The ledge, like all master mineral veins, varies in size, pitch and quality of quartz, yielding enormously at times, and again not paying the expense of extracting the ore. Taken as an entirety, however, the lead has proved itself one of the best in the State. An idea of the immensity of the work performed in this wonderful mine may be found in the fact that there are nearly three miles of shafts and tunnels. On the 27th of June, 1867, a most tragic affair occurred at Osborn Hill. It was similar to the late contest at the Ida Elmore mine in Idaho. A disturbance originated in a dispute regarding the McMurty and Saminer claims, which resulted in a pitched battle, in which five men were killed and a considerable number wounded. The Eureka is the representative ledge of California, and the best gold mine of modern times. Although the Eureka has proved itself the richest gold mine in the world, it was not until November, 1863, that it was profitably worked. The vein runs in a southeasterly and northwesterly direction, pitching west of south at an angle of 79 degrees, the upper wall being syenite and the lower wall greenstone. The rock is of sulphuret order, divided into three grades, paying at the rate of $400, $300 and $214 respectively per ton for the sulphurets, which are worked to within five per cent. of fire assay. The quartz averages $48 per ton. The gross yield of the mine in 1866 amounted to $596,053, and dividends during the same period being at the rate of $30,000 a month, or $360,000 for the year. In 1867 it was about the same. This year nearly $50,000 worth of new machinery has been added, and the dividends remain the same. There are 1,800 feet in the claims, and it is owned by eleven San Francisco gentlemen, five gentlemen of this city, and three New Yorkers—Messrs. J. B. Dickinson, Thomas Hope and Benjamin Silliman. Mr. Watt, the Superintendent, took me through the mine and mill. There are two shafts, respectively 400 and 500 feet. There are 170 men at work in the mine, who extract about seventy tons of quartz per day. There are two sixteen-inch cylinder engines—one for hoisting rock, and the other for pumping water from the mine. The rock is first put through one of Blake's crushers, then goes to the mill, the machinery of which consists of thirty stamps, and Hunter's and the porcupine amalgamation, and washing furnaces for the reduction of the sulphurets. The gold is also assayed and made into bars at the mill.

Colorado.

NEW SILVER DISCOVERIES—FLATTERING YIELDS, ETC.

Says the Colorado *Herald*:—"We have seen specimens of silver ore from the new discoveries recently made on the headquarters of one of the branches of the Chicago Creek. The ore is a dark blue sulphuret mixed through gray quartz, and will probably be easily treated by raw amalgamation, as it is entirely free from galena. The locality in which these new discoveries are situated, offers many advantages for economical working. Abundance of good timber and unlimited water power can be had in the immediate vicinity. A good wagon road can be made up Chicago Creek to the mines without trouble, or very great expense. A party of prospectors are now working there, and intend spending the winter. They packed their supplies up Chicago Creek, but it is only a short distance over to Georgetown; they can walk over in a couple of hours. It is proposed to erect a mill next summer, in this locality, and from what we have seen of the ore and know of the country, we are confident that it will be a paying institution. The ore veins are not very rich, but are large and easily worked."....The same paper reports a good run from the Magnet lode. It says:—"A run was made on ore from this lode, recently, which fully sustains its already high reputation. Four tons and 1,400 pounds gave an average assay of $225 25 per ton, and the owners of the lode realized 80 per cent. of the assay. Huepeden & Wolters treated the ore, and report this as the best run ever made in their mill from a like quantity of ore."....Our cotemporary also tells of a big retort from ore from the Pleasant View mine, which has only recently began to attract attention. It says:—"Mr. Beach placed upon the counter of Warren, Hussey & Co., yesterday evening, (Dec. 2), the result of a three week's run with twenty-five stamps, in the shape of a solid mass of gold, weighing 791 ounces, or 65 pounds, 1 ounce, 5 penny-weights, (worth about $17,000.")

The following additional items are from the same paper:—"Messrs. Miley & Abbe are preparing to erect, a 30-stamp water mill on North Clear Creek, below the mouth of the Missouri gulch. Mr. Miley is now east superintending the building of the machinery.....Col. Tannett is only running 15 stamps, or one section of the Rocky Mountain Co.'s new mill. Scarcity of water is the reason. This seems to be a complaint prevaleut with many mill men just at present. Water is also getting scarce in Mountain City. It is difficult to get enough for household use. This is an evil which grows worse every year. We will have to bring water into the head of Eureka gulch some day, or else stop the mills in winter time.....The Wall-street lode shaft has been sunk on the crevice—which is very wide—to a depth of 25 feet, showing an ore vein 2 1-2 feet wide. It is composed of gray sulphurets and quartz containing silver, as shown by fire assay, all the way from $196 to $3,000."....We condense from the Georgetown *Miner* the following items:—"Prof. Whitney, of Boston, has purchased a duplicate of the machinery for the Burleigh tunnel, to put into his company's tunnel in Fletcher mountain, Ten Mile District.....The Mendota lode is now in shape to produce 10 tons of mineral daily..... Mr. Linn is taking out some very nice ore from the Deming lode, on Republican mountain. Work on the adit is progressing rapidly.....Stewart is engaged in smelting ore from the Robert Emmet lode, situated on Sherman mountain. The yield we have not learned....Wm. Haywood, Esq., of the Equitable Mining Company, is developing the Elephant lode, situated on Brown mountain, about 100 feet below the Terrible. The crevice is six feet four inches wide, between solid granite walls, carrying strings of very fine mineral through the gangue. The shaft is only ten feet deep, as yet, and the ore from the grass roots assayed $247 per ton. The ore carries considerable brittle silver.....We were shown, a day or two since, a fine button of silver bullion, weighing 28 ounces, which was taken from 50 pounds of ore from the Eldorado lode, situated on Saxon mountain. This is at the rate of $1,472, coin, to the ton of ore. The owners of the property are running an adit on the vein, which is now in 50 feet, and carries from two to ten inches of sulphuret ore.....The shaft on the Terrible lode is now 112 feet deep, carrying from eight to 10 inches of first class ore. The ore vein in this lode has been continuous from the surface down. Work on their tunnel is now commenced in earnest. Considerable delay has ensued in order to make necessary improvements for protection against inclement weather, and in fitting in a steam pump."....The Central City *Register*, Dec. 10, says, of the Pleasant View mine:—"The net profits in three months were from fifteen to twenty thousand dollars, and considering the few hands employed and the very small amount of capital invested, it is doubtless the best paying mine in Colorado."

Nevada.

The Comstock.—From Cahil & Co's. circular, reviewing the San Francisco Mining Share market for the week ending Nov 28, we take the following:—"Accounts favorable to new developments in both Virginia and Gold Hill mines are being constantly received, though the deposits recently found in several have not proved so extensive as at first supposed, yet the indications are strongly in favor of there existing at great depths bodies of ore that will pay handsome profits over expenses. From the Gould & Curry the result of prospecting is quite encouraging as to the finding of ore, and, if such should be the case, the mania for speculation in stocks will be greater than ever heretofore, while prices will range correspondingly. At the annual meeting of the Kentuck Company, held on the 25th, the following gentlemen were elected Trustees for the ensuing year: J. D. Fry, A. Hayward, James C. Flood, Thomas Sunderland and William Sharon; subsequently J. D. Fry was elected President, H. C. Kibbe, Secretary, and John P. Jones, Superintendent. The receipts and disbursements have been as follows:

RECEIPTS.

Bullion	$1,257,563 85
Premium on bars	4,232 45
Total	$1,261,796 30

DISBURSEMENTS.

Crushing Ores	$448,323 60
Labor	161,208 62
Timber	54,788 55
Wood	12,114 05
Mine expenses	25,194 43
Assays	12,979 75
Discount	2,770 25
Treasure freight	7,581 88
Office expenses	7,613 58
Gold Hill expenses	1,169 78
Mine improvement	3,375 95
Taxes	7,446 21
Real estate	2,263 50
Legal expenses	1,050 00
Interest	851 20
Hoisting ores	17,544 46
Dividends	450,000 00
Outstanding bills paid	6,876 41
Cash on hand	38,699 08
Total	$1,261,796 30

"The ore statement shows the following results: Ore worked, 31,390 tons; average per ton, $40 06; average cost per ton, $23 65; net profit per ton, $16 41. Of the above amount, twelve dividends, aggregating $225 per share, or $450,000, were disbursed to stockholders during the fiscal year ending on the 21st instant. These figures show an average monthly dividend for the year of $18 75 per share, aggregating $37,500 per month. The stock was first introduced into the public market in April, 1867. The first sale was recorded on the 1st of May, 1867, at $200 per share. The aggregate of the monthly dividends paid to the shareholders since the first public sale is $825,000. The amount paid to shareholders prior to May, 1, 1867, was $217,000, making, with above disbursements, a total of $1,042,000 returned to the owners of the mine since the incorporation of the company on the 22d of August, 1865. The 26 dividends embraced in the above amount show an average of $521 per share, or $10,969 per foot. The first bullion received from the mine was in January, 1866, and amounted to $1,930. The gross yield of bullion to the close of the fiscal year just ended has been $2,832,211, and the disbursements, less $28,609 on hand Nov. 22, 1868, $3,879,202. For the month of November, $28,429 43 has been received.

Washoe.—The Virginia *Enterprise*, Dec. 5, reports the yield of the Occidental mine to have been for November $41,857 55. The

mill of Birdsall & Co., Dayton, was partially supplied with ore from the Occidental mine during the month of November, and returned to the owners of the mine, as the result of the ore reduced, 1,121 pounds of bullion, worth $32,000. The mill is now receiving a full supply of ore, and the yield of bullion is about $1,500 per day. The company confidently expect a return of $45,000 as the result of a full month's run upon their ore by the above named mill. The ore is sent to the mill without assorting, and pays a clear profit of from $6 to $7 per ton over mining and milling expenses. Over 100 tons per day are now being sent from the mine. This is pretty good for an outside mine—a mine having no connection with the Comstock range....The same paper reports the destruction of the hoisting works of the Exchange Company by fire. The loss is set down at from $20,000 to $25,000, with no insurance.

Palmetto.—The Belmont *Champion*, Nov. 21, says that the mines of this district are now looking better than ever before. "The New York Company, under the supervision of Col. Catherwood, is driving the work of developing its mines vigorously ahead, and will have its mill ready to set in operation by the 15th of next month. There is about one thousand tons of good ore on the dumps of the Kentucky mine, and several other leads of this company have smaller quantities of ore of greater or less value, ready for reduction as soon as the mill can be properly arranged for working it. Many other companies in this district, we are informed, are also making small developments on their mines."

Bullion Reports.—During the month of October, there was shipped from the office of Wells, Fargo & Co., Gold Hill, bullion to the value of $263,730 61. "If some of the mines of Gold Hill did not ship their bullion from Wells, Fargo & Co's. Virginia office," says the Gold Hill *News*, "the shipment from this office would be the largest. The Yellow Jacket bullion, for instance, is all melted and shipped from Virginia, making a difference of $50,000 in favor of shipments from that office. Our Gold Hill mines still contain plenty of materials for bullion brick manufacture, with increasing good prospects at the lower levels."....Wells, Fargo & Co. shipped from their office in Austin, during the month of November, 212 bars of bullion, weighing 17,285 pounds, and valued at $282,837 74. Of this amount, $92,030 67 were shipped on account of the First National Bank, and $58,980-23 on account of the bank of John A. Paxton & Co. During the same month the Manhattan mill of Austin shipped 8,448 pounds of silver bullion, of the value of $133,357 22....On the first of December some 3,000 ounces of bullion, produced by the Old Dominion mill at Hot Creek, reached Austin."

Montana.

The Montana *Post*, Dec. 4, thus tells of mining in Cayuse Gulch:—"The gulch is one of the tributaries of Ophir Gulch, situated some four miles above Blackfoot. The discovery of gold was made in it last summer by Messrs. Tibby, Brinton & Belcher, but the ground was not fairly opened until October last, when David Johns and party obtained one thousand dollars from a space fifteen by twenty feet in area. The gold found was very coarse and heavy, one nugget weighing eighty-one dollars, and three or four others weighing from thirty-five to forty dollars being secured. The gulch is supposed to be the main source of gold supplied to Ophir gulch, and those interested in it are sanguine of rich results next season. Twenty-one claims have been staked, but not over a third of them have been worked, the supply of water being scarce. It is thought that these mines will supply about forty men next summer, as it is proposed to flume the ground. The pay streak is about thirty feet wide and twelve feet deep....The mining operations of Col. John Nelson," continues our cotemporary, "deserves attention. It seems that in the upper part of Dry Gulch, upon sinking a shaft some seventy-five feet, a shelly bed-rock was reached, upon which was found coarse gold and good pay. Some distance below, where the gulch is wider, all attempts to find gold have proved unavailing, from the fact that a secondary bed-rock was struck, some twenty-five feet below the surface. It is supposed that this bed-rock is a slide, and acting upon this suggestion, Col. Nelson proposes to sink a shaft till he strikes the same character of bed-rock. He has erected a pump and engine for the purpose of keeping the shaft dry, which is now some twenty feet deep and is being sunk rapidly. The enterprise is worth much consideration."....From Mr. Hyde we learn that Sterling is improving wonderfully in prospects. Capt. Maltby is running the quartz mill belonging to the N. Y. & M. M. D. Co. steady, with very satisfactory results. Other mining operations are in contemplation....From the *Democrat* we glean the following:—"The quartz mill situated in Silver Star, which was erected by Sam. Gaty & Co., but now owned by Porters, in Deer Lodge, was sold by the County Treasurer for $475, the property being worth over $10,000."

New Jersey.

The New Jersey *Courier* has the following account of the richness of the Burlington County Pine Plains:—"The ancient inhabitants of Egg Harbor were strongly impressed with the belief that gold mines existed beneath the surface of the Plains. It used to be the custom of many of the farmers along the sea shore, in the spring time, to drive a number of their cattle over the Plains, to pasture on the savannas, in the swamps, and on the uplands of that wilderness section. The cattle usually remained there until the approach of winter, when they were looked after and driven back by their owners. There is a tradition that, on one of those homeward expeditions, one of the cattle which drank at a watering place on or near the East Plains, was slaughtered soon after reaching its destination, and that on opening the stomach of the animal there were found a number of particles of gold, which it was supposed it had swallowed with the water drank on the Plains. After this discovery, several persons got together, and, forming a prospecting party, proceeded to the plains to search for a gold mine. Before digging very far they found a certain kind of earth, which contained minute particles of gold-dust. One of the party took some of the earth to Philadelphia for examination. The inspectors pronounced it pure gold, but said that it was in such small quantities that it would not pay the expense of mining. So the gold fever subsided, and the Plains were left alone, with their dwarf pines, oaks, huckleberry and gooseberry bushes. The place where the party of good diggers found the precious dust is said to be near what is familiarly known as the 'Watering Holes.' These Plains may be an El Dorado. If it was gold found by those ancient diggers, it is highly probable that in some other sections of the Plains there are far richer veins. The Plains are usually sandy, and so barren that anything like vegetation is exceedingly dwarfish. In former times the Plains were the home of numerous deer, which in the autumn fatted on the acorns that grew on the dwarf oaks, and here also great numbers of grouse subsisted on the gooseberry. The deer and the grouse were eagerly sought after by sportsmen from various sections."

Missouri.

SCHOOL OF MINES AND AGRICULTURE.

The Washington County *Journal* has the following:—"At a meeting held in Potosi, Washington county, Missouri, Dec. 14, 1868, to consider the propriety of organizing a School of Mines and Agricultural Science, on motion, Prof. Forrest Shepherd was elected chairman of the preliminary organization, and Joseph E. Ware was elected Secretary. On further motion the chairman appointed a committee to prepare a form of permanent organization, and to nominate a President and other officers. J. E. Baldwin and Joseph E. Ware were appointed such committee, with instructions to report at one o'clock P. M., to which time the meeting then adjourned. The sitting was resumed pursuant to adjournment. The following report of the committee on organization and nominations was submitted and adopted:—"*Name of Institution.*—The Missouri School of Mines, Metallurgy and Agricultural Science. *Location.*—Buildings,—Potosi, Washington county, (conditional.) *Faculty.*—President and Vice President, with *Professorships* in Mining, Mechanics and Physics; Engineering, Mathematics and Mining Surveying; Geology, Mineralogy and Metallurgy; analytical, applied and agricultural Chemistry, and Entomology; an Actuary, Treasurer, Librarian and Custodian of Museum. *Sources of Support.*—Endowments, Patron fees, Scholarships, Tuition fees and Degrees. An election, in accordance with the requirements of form of organization adopted resulted as follows:—

"President of Faculty, Professor Forrest Shepherd, of New Haven, Conn.

"Vice-President, Edwin Harrison, of St. Louis.

"Actuary, Joseph E. Ware, of Potosi.

"Recommended that until the Professorships are filled and suitable buildings obtained, that a system of instruction by Lectures be adopted, with movable quarterly sessions.

"*Resolved*, That the officers-elect be notified of their election, and that commencement exercises include installation of President and Vice-President, with inaugural addresses.—Adjourned to a call of the chairman. JOSEPH E. WARE, Secretary."

Tennessee.

GREAT SALE OF MINERAL LANDS.

The Knoxville (Tenn.) *Press and Herald* is the authority for the following statement:—"For some months past, as our readers will remember, our columns have contained the advertisement of Captain Moses W. Nelson's valuable mineral lands in Carter and Johnson counties for sale. The captain has persistently refused, all the while, to sell any part of his lands unless the purchaser would take the whole. As this required too large a sum of money for any one in this part of the country, the lands have been some time in the market. We are glad to learn that the captain has at length, through the agency of his attorney, Gen. Ramsey, of this city, succeeded in disposing of his entire possessions for the handsome sum of ten millions of dollars. We understand the purchaser is a London capitalist, or rather a company of capitalists, who may probably soon enter into the most extensive mining business ever undertaken in this country."

Idaho.

The Owyhee *Avalanche*, Dec. 5, has the following account of the Ida Ellmore mill.—"This excellent twenty-stamp mill, formerly called the 'Lincoln,' but by reason of a recent baptismal rite, now the 'Ida Ellmore,' has steamed up again, after having been thoroughly renovated and burnished in a most splendid style. The proprietors, J. M. Wilson & Co., have incurred a vast expense in repairing, but now have the proud satisfaction of owning one of the completest and best quartz mills of its capacity on the Pacific Coast; everything connected with it not only looks splendidly, but it is of the most complete and substantial character. There are now in the yard about 600 tons of Ida Ellmore ore, of a grade which gave the mine its almost world-wide celebrity. A substantial and commodious reservoir has been built for tailings, and everything is in tip-top running order."

Dakota.

The Frontier *Index* has the following intelligence from the Sweetwater mines:—"Ore from the Bobtail has yielded $117 per ton in the Cariso mill....There are 40 men working at Hamilton and 60 at Rock Creek; wages $5 per day....Spring Gulch, eight miles north of South Pass, pays $8 per day....Capt. Zabriskee is bringing over the Pacific mill from Silver City, Nevada, to locate on the Atlantic lead....Walsh's twenty-stamp mill, from Chicago, will be at work on the Miner's Delight in a few days....It is believed six mills will be in operation next spring, and that several thousand people will find compensated employment the next year.

Canada.

Mining matters continue very flat in the Madoc Gold District. Very little is being done in the mills, still less in actual mining, and least of all in prospecting. The Belleville correspondent of the Canadian Monetary *Times* thus tells of the doings of the prominent companies. He says: "The Richardson Company have remodelled their works, under the superintendence of Mr. Dunstan, by taking out the Wyckoff oscillating cylinders, which have proved quite inadequate to treat successfully the ores of this district, and now perform their amalgamation in the mortars, collecting the amalgam which passes the screens in copper-lined and amalgamated sieves. By this method they have obtained the following results: No. 1, 25 tons refuse rock from the outside of the mine-house produced $115, or $4.60 per ton, at an expense of about $2 per ton for the reduction. No. 2, 25 tons of rock from the inside of the house (this has been several times picked out), produced $175, or $7 per ton; expense about $1 25 per ton, according to superintendent's report. No. 3, 25 tons similar rock. (I have not got the full details of this crushing; but as the total yield of gold from the three crushings is stated at $412, the value of No. 3 would be $122, or nearly $5 per ton.) This is so far satisfactory, as it proves that the mine is not yet exhausted, and that the want of proper management was the proximate cause of the previous lamentable failure. There can be little doubt that by the introduction of the improved pans, the yield might be materially increased; but the directors have determined to incur no additional expense until they have brought matters into a better position. The owners of the Barry mine, in Elziver township, have also been working, but no report of their success has as yet been given to the public. Mr. W. Berry has returned to Belleville, and is about to resume operations at his mill in Denbigh township. The mill of the Toronto & Whitby at Bannockburn is verging towards completion; a great part of the machinery is in place, and they expect to commence running in February. The Merchants' Union Company have got their machinery removed from Eldorado, and erected in the village of Madoc. Some experimental crushing has been done there under the direction of Dr. Rae, of Syracuse, who claims to have discovered an effective method of extracting gold from its ores by the agency of thermo-electricity; but the results of his experience have not hitherto been made public. The fine and expensive machinery of the Anglo-Saxon Company is finally closed; the Wyckoff cylinders having there also proved a total failure."

COPPER.

Michigan.

The Ontango *Miner* reports that it is proposed to work the Knowlton mine with 12 miners during the winter. The mine is looking well and producing largely for force employed. The Evergreen intend to continue present force for winter. The mine looks well. The Portage Lake *Gazette* furnishes the following items of news: "The product of the Hecla mine for November foots up 237 tons; Calumet, 131 tons; Knowlton 13 tons 1,450 lbs.; Evergreen Bluff, 18 tons; Ridge, 21 tons of man and barrel work." Reviewing the National Mine, our cotemporary says: "The stamps have produced ten to twelve hundred tons of rock during the summer, yielding about one per cent. mineral. During the winter they will be idle, which will probably reduce the monthly product of the mine. The old veins, on which they have been operating, are not productive in stamp work, and the winter's accumulation can be easily treated during the summer. The company have now taken a wise step in commencing to open up their north lode, which is a stamp work vein, showing a good percentage of mineral. This will enable them to run their stamps the year round hereafter. The present force of miners is fifty-two, twelve of whom are on the cross lode in the conglomerate belt, where there is now a heavy mass of copper exposed. Workings on the vein proper are producing the usual amount of small masses and barrel work. The new modeled pumping engine is using two cords of wood less per day than formerly. A large platform for holding rock is nearly completed."...Of other mines it says: "The Knowlton Mine stamps are closed for the winter. The force of miners has been reduced to twelve, who will be employed during the winter in opening ground exclusively. The mine is looking well.....Ogima Mine stopped work on the new vein and closed the stamps for the winter. They are working fourteen miners, mostly opening on the old vein. The workings are looking as well as could be expected for the small force employed. One slope worked by four men turned out over four tons of copper in November. The product for the year will reach one hundred and twenty tons, against fifty-four tons the year previous.....The Evergreen Bluff Mine stamps are closed for the winter. Sixteen miners will be employed during the winter in opening. There is a decided improvement in the appearance of the mine since the first of November. The Ridge Mine looks encouraging. All of the slopes show copper. They have quit stoping for the season, and all the force will now be employed in opening ground. Thirty men are now employed in driving the ten, twenty and thirty fathom levels west, and sinking No. 3 shaft and a winze from twenty to thirty fathoms level. The Aztec mine commenced operations in August. They commenced to take water out of the shaft on the Indian Diggings vein on the 25th. The shaft is eighty feet deep. As soon as the water was taken out, Captain Buzzo, the new agent, had some shots fired in the foot wall, which had been stulled over by the last agent. This brought to light some horns of copper, which led to a fine nest of masses and barrel work. Up to November first, about seventeen tons had been taken out. The product for November will be eighteen to twenty tons, making thirty-five tons, taken out inside of three months, by an average of ten miners stoping and gouging in the bottom and side of a shaft. There are several tons of copper in sight, the vein showing fifteen feet in width, the horns of copper protruding for forty-five feet in height. Quite a large mass is standing in the bottom, which a sand blast has failed to remove. A drift east from the bottom of the shaft will soon be started, and regular work inaugurated.. 'Union Pewabic.'—This, it is reported, is to be the name of the consolidated Pewabic and Concord. The rumor that a track was to be laid this winter from the Concord workings to the head of the Pewabic Incline lacks confirmation, but orders have been received to stop all work at the Concord, and remove tools, etc., to the Pewabic."

ZINC.

Missouri.

We learn through the Potosi *Journal* of the 3d inst., that operations are suspended at the Hesselmeyer Zinc Works, in that place, for the present; workmen being engaged in remodelling and extending the capacity of the establishment. "Under the auspices of the newly-organized company (continues our cotemporary) operations will probably be renewed upon a far more extended scale at this point, while other branches of the company's operations may be carried on in the vicinity of Carondelet. The zinc interest is destined to occupy a far more important position among our local interest than has ever yet been accorded it." [Regular shipments of zinc have been made from the Hesselmeyer Works for some time past. The amount of zinc shipped for the week ending Tuesday, the 24th ult., was 111 slabs, or 3,330 pounds.—ED.]

COAL, IRON AND OIL.

Montana.

No two minerals are more needed in the future development of our territories than coal and iron. The Montana *Post* reports that prospectors in their search for gold and silver, have, in almost every mineral district of that territory, found traces of these minerals in abundance, but with the single exception of one coal bed near Boseman, and one below Fort Benton, these traces have not been explored. It continues: "One good coal bed in each mining district, and one or two veins of iron ore, would be of more value to the territory in the development of its gold and silver ore, and to the discoverer, than the discovery of the same number of gold and silver lodes. Coal would diminish the expense of reducing metals, both by amalgamation and smelting, fully one-third, and iron would soon put most of the machinery for mill purposes within the means of our home operators, and in a measure relieve our present dependence upon foreign capital. In some of our most prominent quartz districts, wood for fuel has to be hauled a distance of ten miles, at an expense of from seven to ten dollars per cord. And it cannot be many years, with the present prospects for extensive operations in quartz mining, before wood will become scarce in all the districts. Coal of excellent quality abounds in all parts of the territory, if we take unerring traces as evidence. It has been found at Bannack, Argenta, on the Big Hole, on the south side of Bald Mountain, in the Madison and Gallatin ranges on the Missouri, near Helena, on the Dearborn, and on several of the islands below Fort Benton, as well as the banks of the Missouri. A full exploration of either of these localities would probably result in the discovery of large deposits, and prove a permanent benefit to the territory. The coal veins on the Yellow Stone, probably as extensive as any others on the continent, can only be made practicable by the con-

struction of the North Pacific Railroad. That great work would supply us with fuel, for all purposes, at a price merely nominal, but until that is made, or the present interdict of the Government removed—which assigns the finest agricultural region of the territory to the Indians—we must economize the resources we have. What is true of coal is equally true of iron. The territory is full of evidences of its abundance, but as yet the pervading mania for gold and silver has rendered its development a matter of minor consideration. This is all wrong. With the discovery of coal and iron, a new distribution would be given to labor, which, of itself, would add materially to the wealth and enterprise of the territory, to say nothing of the great reduction it would afford to, other pursuits. With our present means of livelihood, these two minerals would supply all the needful wants of the territory, and give us an immense advantage over Nevada and Idaho in the reduction of our precious metals. The same amount of labor bestowed by the prospector in the discovery of a gold or silver lode would, with equal probability of success, open a coal or iron bed, and the reward, in our present necessity, would be much more immediate, and quite as productive. If success were dependent upon mere search for these minerals, the case would be different, but the fact of their existence is undoubted. The localities are known. Development only is necessary. An enterprising company of a few men can soon ascertain whether either of the places designated are practicable; and it is a little strange, that of the great number of prospectors in the territory, few have deemed them worthy of attention. Our citizens generally indulge the belief, that within the next five years, at most, our territory will have railroad connection with the Union Pacific. Nothing would sooner confirm that belief than the discovery of unfailing beds of coal and iron. If both of those articles could be found here in quantity and quality sufficient to supply the needs of the road, it would hasten the construction of a branch road, and open up to our citizens an immense commercial pursuit, scarcely inferior to that promised by quartz mining. Such companies as that contemplated by Mr. Ward of Detroit, two years ago, would then come to our territory with an assurance of success. We make these remarks, hoping that they may meet the eye of some prospector who has, in the field of explorations, from evidences of one or both of these minerals, sufficient to invite his more thorough investigation. They are to-day first among the wants of the territory. A speedy fortune is in store for him who first renders them of practical utility to the people of the territory."

Nevada.

The Unionville *Register* says of the Humboldt coal fields: "From William C. Gregg, who is just down from the Upper Humboldt, we learn that quite a large area of coal land has been located by coal prospectors at the place of the late discoveries. Some samples of the coal were sent to Sacramento by Mr. Strowbridge of the railroad company, and the result of tests made were entirely satisfactory. The specimens tested were taken from the outcrop of the vein, and were pronounced a fair quality of coal blossom or bituminous shale. Mr. Strowbridge has made arrangements for sinking on the vein to the necessary depth to give it a fair test."

Mexico.

The Two Republics—an American newspaper published in the city of Mexico—has the following account of petroleum in Oaxaca: "We learn from a correspondent at Puerto Angel, that the petroleum wells which have been taken in hand by a California company, are turning out most favorably. It appears that the whole district around Puerto Angel *is one vast deposit of petroleum*, equal to that of Pennsylvania, with oil of the best class. In three months time there will be six or eight wells in full operation, giving each from 150 to 300 barrels per day, of first class oil. This crude oil will be taken to San Francisco to be refined—as there will be a constant run of vessels between Puerto Angel and California. This discovery of oil will make the State of Oxaca one of the most prosperous States in the Republic. The oil can be run down in tubes from the wells, and put on board the ships without any cartage or boating, a vast saving of expense. In short the discoverers in Puerto Angel are fully satisfied with their prospects."

Manufacturing and Mechanical Notes
NO. XLIII.

New Sub-Marine Rock Drill.

The doubt as to whether the long-mooted removal of the Hellgate obstructions could be effected by any process in use among European engineers, owing to the rapidity of the tide, has given an impulse to American invention with a special view to solve the problem of removal beyond a doubt; and Mr. SIDNEY F. SHELBOURNE has produced an invention in the way of sub-marine drill which, it is claimed, will answer the purpose. It will be remembered that to Mr. SHELBOURNE was some time since awarded a contract for the removal of the Frying Pan and the Pot Rock; and should he be successful in this, no doubt the clearing of the East River of all obstructions will speedily follow. The obstructions, further than now contracted for, need not be specified or discussed, since, by reference to the report of the surveying commission, which has been printed, and is held for gratuitous distribution by Mr. GEORGE W. BLUNT, of the Hellgate Pilots' Bureau, a full description may be obtained.

Experts have pronounced the drill, now on exhibition at the shop of Messrs. MORRIS & CUMMINGS in Duane Street, to be the best invention for the purpose yet developed by American ingenuity.

The first problem to be solved was to produce something not subject to be displaced by the action of the tide, which at Hellgate is very violent. For this purpose, the engines which drive the drill have been enclosed in an iron mushroom, weighing about five tons in itself, to which weight must be added that of two tons of lead—being introduced simply for the purpose of augmenting the gravity of the whole. The mushroom is water-tight, about seven feet in diameter, by a perpendicular of three, or a depressed semi-spheroid, and has the general appearance of a gigantic cast-iron spider of the old New England pattern, turned bottom upwards. The mushroom is made to sit firmly on the rock to be bored by means of three sharpened steel legs; and from the center of it protrudes the shaft which is to enter the solid rock beneath. This shaft is 1 1-2 inches in diameter, and hollowed for the water to pass through it, which is led into it with a small hose, and, thence, through a hole in its boring end into the excavation, thus washing it continuously, and preventing the concentration of heat as well as of powdered stone. Three spiral grooves on the external surface liberate the water from the excavation as rapidly as it enters, thus keeping up a rapid and continuous aqueous action. This tube or shaft is nine feet in length, and is worked by a couple of engines located with piston rods working at right angles upon an eccentric, which by means of a cog propels it. The revolutions are estimated at 300 per minute, which is reckoned equal to a penetrative power of 1 inch. The bit, by which the cutting is effected is of equal diameter with the shaft, and is studded with from eighteen to twenty black diamonds, the action of which grinds the rock to powder in passing. The pressure upon the drill is effected by means of the process known as differantial grooving, which has the merit of being both equal and positive, though it may be found too unyielding for the purpose, and a more flexible pressure may need to be adopted.

The upper end of the shaft is supported by a frame-work of wrought iron; and the engines are fed with steam-power through pipes from a boiler located on board a tug in attendance.

It is claimed that by means of this drill the work can be carried on with less diving than is inherent to the ordinary process; and, certainly, experiments at the shop on Quincy granite have demonstrated the capacity of the bit to cut at the rate of five feet per hour.

The hole drilled and the shaft withdrawn, information is given by means of a magnetic bell, acted upon and actuated by a small wire cord passing down one of the tubes upon which is fixed the cross-head. A wrecking tug, with derrick for removing heavy weights, and a boiler to feed the submarine engines, completes the appliances for the work in hand. From this boiler, to prevent its condensation *in transitu*, the steam is passed through a hose enclosed in a second hose, which returns the exhausted steam. The explosive used will be, of course, nitro-glycerine, fired off in the usual way.

The grapple used in connection with the blasting process is a very simple automaton, with a grappling power of three tons to a lifting power of one.

The rock to be bored is bastard granite, and, in volume, was somewhat reduced some years since by the Millefoot process.

Another Velocipede.

The common velocipede is so well known that a detailed description would be superfluous. In the streets and public squares of the chief cities of Europe, as will, no doubt, soon be the case all over America, are daily witnessed the swift and graceful evolutions of this wonderful little machine, as it

flies in and out among more imposing equipages, safely moving where they dare not venture, and even passing equestrians in their own favorite haunts. With those who live in the cities and require a daily exercise, exhilarating, pleasant, healthful and free from expense; with those who reside in the country and have long distances to traverse daily in reaching the scene of their labors, or with those who have leisure and wealth at their command, but love such exercises as afford an opportunity for the display of grace, agility and skill, the velocipede will soon become as great a favorite in this country as it is in France and England. The machine seems peculiarly fitted for the "go ahead" propensities of Young America, and is destined to be a great innovator upon old modes of travel. We see no reason why it should not be as great a favorite on the Pacific Coast and among the mining regions as in Europe and at the east. Where the railway has not yet made its appearance, and a quick locomotion is desired, the traveler, in company with his velocipede, can accomplish a journey of two or three hundred miles more readily than by any other conveyance.

To learn how to manage the velocipede requires no more skill, courage or patience than to acquire the art of skating, perhaps even less, and when the art is once learned, as it may easily be in a few days, it provides a means of locomotion and a source of enjoyment, as much more available and delightful than the art of skating as the number of the days in the year is greater than the few bright mornings when you can find a smooth, glassy, and well-frozen skating ground.

After several months spent in experimenting, Messrs. G. H. MERCER & MONOD, of New York city, have, by their untiring zeal and perseverance, succeeded in making a velocipede that must command the admiration of all who can appreciate a good thing. These gentlemen have collected all the best points of the French machine, and combined them in one. By the rakish style of the steering post, which is peculiarly their own, the rider has the most perfect control over his machine, enabling him to handle it with perfect ease, after he has once become master of the balancing power. The arms of the rider are in a very easy and graceful position.

A large riding room has been opened at No. 3 William street, New York city, and is kept open all day and is at the disposal of beginners, who can for a very small charge acquire in a few days the art of riding the velocipede.

Mint and Mining Statistics.

The report of the Secretary of the Treasury to Congress contains the following:

"The attention of Congress is called to the annual report of the Director of the Mint, which contains the usual statistics of the coinage of the country, and the various suggestions and recommendations, which are worthy of consideration.

"The total value of the bullion deposited at the mint and branches during the fiscal year was $27,166,318, of which $25,472,894 was in gold, and, $1,693,423 in silver. Deducting the re-deposit, the amount of actual deposit was $24,591,325.

"The coinage for the year was in gold coin $18,114,425; gold bars, $6,026,810; silver coin, $1,136,750; silver bars, $456,236; nickel, copper and bronze coinage (one, two, three and five cent pieces), $1,713,385; total coinage, $20,964,560; total bars stamped, $6,483,046.

"The gold deposits of domestic production were at Philadelphia, $1,300,338; at San Francisco, $14,850,117; at New York, $5,409,996; at Denver, $357,935. The silver deposits were at Philadelphia, $67,700; at San Francisco, $651,239; at New York, $262,312; at Denver, $5,082.

"The gold and silver deposits of foreign production were, $1,686,602. The amount of gold coined at Philadelphia was $3,864,425; at San Francisco, $14,979,558; of silver at Philadelphia, $314,750; at San Francisco, $822,000; of nickel, copper and bronze at Philadelphia, $1,713,385. The total number of pieces coined was 49,735,840.

The branch mint at Denver has never coined money, and its expenses are entirely out of proportion to its business. The law under which it was organized should be repealed, and the institution reorganized as an assay office.

"During the past year the branch mint building at Carson City, Nevada, has been completed, and the necessary machinery and fixtures have been forwarded. It will be ready for work early next season.

"The mint at Philadelphia and the branch mint at San Francisco have the confidence of the people and of the government, and when the new mint building at San Francisco is erected, these mints will be of ample capacity to supply coinage for the whole country. The business of coinage requires large and expensive establishments, under charge of men of science and undoubted integrity; and such can be successfully maintained only at commercial centres, where bullion of different degrees of fineness is continually offered for manipulation. The establishment of additional branch mints is therefore unnecessary, and would be injudicious.

"The entire deposits at the branch mint at San Francisco were formerly in unpartedbullion; now nearly two-thirds of the amount is deposited in bars, refined by private establishments. The law requires that the parting charge shall equal the actual cost of the process; but the experience of the past four years shows that not less than thirty thousand dollars annually may be saved to the government by discontinuing the business of refining upon the Pacific Coast; and it is, therefore, recommended that the Secretary be authorized to exchange the unparted bullion deposited at the mint for refined bars whenever, in his opinion, it may be for the public interest to do so.

"It is also recommended that authority be given for the redemption of the one and two cent pieces by the Treasurer, under such rules and regulations as may be prescribed by the department.

"On the 1st day of April last Mr. R. W. RAYMOND was appointed Commissioner of Mining Statisties, in place of Mr. J. Ross BROWNE, now Commissioner to China.

"Mr. RAYMOND was instructed to continue the work so ably commenced by his predecessor, and his report will show with what diligence and ability he is performing the duties assigned to him. The Secretary invites the attention of Congress to this report, and asks for the recommendations which it contains due consideration."

English papers announce that ground has been surveyed and broken for the construction of a line of railway, by British capitalists, in Persia.

MARKET REVIEW.

FRIDAY EVENING, Dec. 24, 1868.

Copper.—The market has been very unsettled owing to the Tariff Bill having been postponed in the Senate until January. Cash sales have been made as low as 23½c. for Baltimore, and 23¾ for Detroit. Sales of the week 500,000 lbs., part for January delivery, at 24½@24¾c., and for February and March at 25c.

The London Market is unchanged, at £69 for Chili Bars.

Tin continues in good demand. Sales 1,000 slabs Straits, on the spot, 27½c; 1,400 to arrive in Boston (distant shippers) at 27c. Banca nominally 30c. English 27½@27¾. gold.

The London Market advanced on the 22d to 100s. for English and 109s. for Straits.

Spelter dull at 6½@6 30-100c. for Silesian.

Lead on the spot, small lots, at 6¼c., gold, for ordinary foreign.

THE IRON TRADE.

NEW YORK, Dec. 26, 1868.

We report an extremely quiet market for iron of all kinds, and the only sales we hear of are about 200 tons of American—Thomas and Allentown at $42 00.

Forge Iron remains quiet with but little inquiry, and we do not anticipate any business until after the holidays.

Scotch is weaker; sales of 300 tons Glengarnock, ex ship, at $40 00; English is held at $39 00: Glengarnock, $40 00, and Gartsherrie $41 00, ex ship. There have been for the sales 300 to 400 tons from yard and ship.

Old Rails—sales of 800 tons on private terms.

Scrap Iron is quiet—no sales of moment.

New Rails—1,000 tons to arrive at New Orleans, at $34 00, gold.

BOSTON, December 23, 1868.

The market for Pig Iron remains the same, with steady but moderate demand. The sales have been at $41@45 per ton for Scotch, Gartsherrie, Coltness and other brands; and American Pig at $40@$45 per ton. In Bar Iron the sales have been confined to small lots, at previous prices. Russia Sheet Iron is quiet, and prices are nominally 11½@13c. per lb., gold; and 300 packs has been sold in New York on private sales.

Imports of Pig Iron from January 1 to December 19, 1868:

	1868.	1867.
From Great Britain, tons	20,264	29,695
Coastwise Ports	11,000	8,682

PHILADELPHIA, December 22, 1868.

In Pig Metal there is no change to notice. Sales of No. 1 Anthracite at $42@$43, and No. 2 at $38@$40. Scotch Pig sells at $42 50 and $43, and Forge at $35@$35 50 per ton. Manufactured Iron commands $87 50 for Bars. Blooms are quiet.

Lehigh Valley Iron Trade.

Pig Iron transported by the Lehigh Valley Railroad Co. for the week ending Dec. 19, 1868:

From	Tons.	Total.
Carbon Iron do	140	8,050
Lehigh Valley Iron Co	290	9,130
Thomas Iron do	875	31,700
Lehigh Crane Iron do	1190	31,155
Allentown Iron do	420	23,245
Robert Iron do	285	9,380
Glendon Iron do	480	20,744
Other Shippers	620	15,840
Total	4,300	149,214

THE COAL TRADE.

NEW YORK, Dec. 26, 1868.

The coal trade may be reported quiet, with no change from the prices as last quoted. From the mines we learn that a number of the colleries are standing still, and will not resume work for some time. From Philadelphia we get the report that trade is quiet. Shipments have closed. No new orders are coming in. City and line trade is brisk. Attention is called to the 69th Scranton sale advertised in our columns, to take place on Dec. 30, 1868, at which sale 75,000 tons will be sold. The sale will be positive. The conditions will be fully made known at the time of sale.

BOSTON, December 23, 1868.

There is no change to notice in coal. English Cannel continues to be purchased in small lots, at $18@$20 per ton. In Sidney and Pictou nothing of any consequense has been done, and prices are quite nominal. Anthracite has been in steady retail demand at $11@$12 per ton, and cargo prices are nominally $10@$11 per ton.

PHILADELPHIA, December 22, 1868.

There is less doing, but prices are unchanged.

The following table exhibits the amount of Coal that was passed over the various routes of transportation from the Pennsylvania Coal districts for the week ending Dce. 19, 1868, and for the season to that date. A comparison is also made with the amount transported the corresponding week in 1867 showing the increase or decrease, as the case may be:

COMPANIES.	1867. WEEK.	1867. TOTAL.	1868. WEEK.	1868. TOTAL.	INC. OR DEC. WEEK	INC. OR DEC. YEAR.
Phil. & Read. R. R.	....	140,373	48,914	95,894	....	d 46,479
Schuylkill Canal	....	132,925	....	1,158,901	....	d 164,014
Lehigh Valley R. R	35,214	102,694	46,306	102,231	11,092	d 463
Lehigh & Sus. R. R	....	....	....	948,198	....	78,656
Lehigh Canal	....	1,006,660	....	987,947	....	16,657
Scranton North	8,988	493,248	8,893	565,609	15	2,861
Scranton South	17,600	1,197,739	28,889	1,075,022	11,289	122,717
Penn. Coal Co. rail.	10,015	820,088	15,390	897,720	4,275	77,632
Penn. Coal Co. canal	....	21,169	....	29,004	....	7,835
Del. & Hud'n Canal	....	1,401,122	....	1,640,118	....	238,998
Shamokin	6,308	475,718	6,527	485,739	219	10,021
Trevorton	556	47,170	7,211	38,131	215 d	9,039
Short Mountain	898	81,175	718	123,088 d	185	39,913
Lykens Valley Co.	989	84,469	708	83,069 d	281	1,398
Hunt'g'n & B'd T'p	5,232	258,183	6,332	273,878	1,100	35,695
Wyoming South	....	369,060	....	319,764	.... d	49,335
Wyoming North	....	82,376	....	89,152	....	6,776
Williamstown Col.	....	123,109	....	180,304	....	57,195
Total	85,750	8,047,286	84,135	9,125,769		
	84,135			8,074,286		
Decrease	1,615			1,078,513		

Schuylkill Coal Trade.

BY RAILROAD AND CANAL, FOR WEEK ENDING, DEC. 26, 1868.

	RAILROAD.	CANAL
St. Clair	15,114	....
Port Carbon	5,252	....
Pottsville	1,450	....
Schuylkill Haven	13,989	....
Auburn	2,638	....
Port Clinton	4,598	....
Company's use	2,605	....
Total for week	45,646	....
Previously this year	95,894	....
Total	141,540	....
Same time last year	171,571	....
Decrease	30,031	....

Report of Coal Transported over Lehigh Valley Railroad

For the week ending December 19, 1868, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREVIOUSLY Tons. Cwt.	TOTAL. Tons. Cwt.
Total Mahanoy	1,078 08	6,642 16	7,721 04
Total Hazleton	26,402 03	29,684 07	56,086 10
Total U. Lehigh	296 05	466 09	762 14
Total B. Meadow	11,082 18	8,747 13	19,830 11
Total Wyoming	7,447 00	10,383 19	17,830 19
Grand total	46,306 14	55,925 04	102,231 18
Same time last year	35,214 19	67,479 09	102,694 08
Increase	11,091 15	....	....
Decrease	....	11,554 05	462 10
Forwarded east from M. Chunk by r'l	46,306 14	55,925 04	102,231 18
Delivered at Mauch Chunk	16 05	94 16	111 01
Del. on line of r'd above M. C'k	249 13	371 17	621 14
Del. sb. M. C. for use of L. V. railr'd.	3,745 12	....	3,745 12
To L. & S. r'd at Penn Haven for rail	246 13	3,381 09	3,628 02
Do. for shipm't by canal		4,184 06	4,184 06
At M. Chunk for shipment by canal		2,660 19	2,660 19
Total by rail and canal	50,565 01	66,618 11	117,183 12
Same time last year	35,332 41	68,576 11	103,909 02
Increase	15,232 10		13,274 10
Decrease		1,958 00	....

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

At New York, Dec. 5, 1868.

Schuylkill R. A., choice	$ 9 00	$....	Schuylkill Chestnut	$7 00	....
" Ordinary	8 50	....	Lehigh W.A.L'p old Co.	8 00	....
" W. A. Lump	7 50	....	" Broken	8 75	....
" Steamboat	7 50	....	" Egg	8 00	....
" Broken	7 75	....	" Stove	8 50	....
" Egg	8 00	....	" Chestnut	6 50	....
" Stove	8 50	....	Shamokin	6 50	....

At Philadelphia, Dec. 10, 1868.

Lehigh L'p and St'mb't	6 50	6 75	Henry Clay, Egg & St	6 75	7 00
" Broken and Egg	6 75	7 25	Locust Mount Lump	....	5 50
" Stove	7 75	8 00	" Steamboat	6 00	6 25
" Chestnut	6 00	6 25	" Broken	6 25	6 50
Schuylkill R. A	6 25	6 50	" Egg	6 25	6 50
" Chestnut	5 00	5 25	" Stove	....	7 75
" W. A. Lump	....	5 25	Lorberry Coal	8 00	8 00
" Broken	6 00	6 25	Shamokin	6 00	7 00
" Egg and Stove	....	6 50	Franklin, (Lykens Val.)	8 00	....
" Chestnut	5 25	5 50	Broad Top	....	5 00
Hill & Harris, Egg & St.	....	6 75			

SPECIAL COALS.—DEALERS' QUOTATIONS.

Diam'd Vein R.A., Sch'kill	8 75	....	Old Co.'s W. A. Lehigh	7 00	8 25
Locust Dale W. A., "	8 50	....	Mt. Pleasant	7 00	8 25
Honey Brook " Lehigh	7 00	8 25	Buck Mountain	7 00	8 25
Harleigh " "	7 00	8 25	Buck Ridge W.A., Sh'kin.	8 50	....
Spring M'n " "	7 00	8 25	H. Heils, E. F'klin, Lorb.	8 50	....
Sugar Creek " "	7 00	8 85	New England Red Ash	7 25	7 95
Sugar Loaf " "	7 00	8 25	Wyoming	7 50	....

Dealers in these Coals may be found in our advertising columns.

Scranton Coal at Elizabethport, Dec. 10, 1868.

(Corrected weekly by D. L. & W. R. R. Co.

Lump	6 25	....	Egg	6 50	....
Steamer	6 50	....	Stove	6 50	....
Grate	6 50	....	Chestnut	6 25	....

Prices for Pittston Coal at Newburgh, Dec. 10, 1868.

(Corrected weekly by Penna. Coal Co.)

Lump, per ton, 2240 lbs.	....	....	Egg " "	....	....
Steamer, " "	....	....	Stove " "	....	....
Grate " "	....	....	Chestnut " "	....	....
Pea " "	....	....			

70 cents additional to New York.

Lackawanna at Rondout, Dec. 10, 1868.

Lump	6 25	....	Egg	7 75	....
Steamer	6 50	....	Stove	8 00	....
Grate	7 00	....	Chestnut	6 50	....

65 cents additional to New York.

Lehigh Coal at Elizabethport, Dec. 10, 1868.

Lump	7 50	....	Chestnut	....	....
Steamboat and Broken	7 50	....	Stove	8 25	....
Egg	7 75	....			

Wilkesbarre Coal at Hoboken, Dec. 10, 1868.

(Corrected by Wilkesbarre Coal & Iron Co.)

Lump	6 50	....	Egg	7 25	....
Steamer	7 00	....	Stove	8 25	....
Broken	7 00	....	Chestnut	7 00	....

At Baltimore, Dec. 10, 1868.

Wholesale prices to trade.			Trevorton R. A	$....	....
Wilkesbarre by cargo or car load	$8 25	@8 50	By retail, per ton of 2,240 lbs., delivered	10 00	10 50
Pittston and Plymouth	....	8 25	Georges C'k & Cumberland f. o. b. at Locust Point for shipping	....	5 00
Shamokin R., or W. Ash	....	8 50			
Lykens Valley, R. A	8 50	8 75			

At Havre de Grace, Md.

Cargo prices for shipment *south* of Patapsco River, (drawback allowed of 10 per centum.)			Shamokin R. or W. Ash	$....	@8 50
			Lykens Valley R. A	....	8 50
			Trevorton R. A	....	....
Wilkesbarre and Pittston W. Ash	$....	@8 00			

At Georgetown, D. C. and Alexandria, Va.

George's Creek and Cumberland f. o. b. .... @4 75

Prices of Gas Coals.

November 21, 1868.

PROVINCIAL. Duty, $1 25	Coarse. Gold.	Slack. Gold.	AMERICAN.	Coarse. Currency.	Slack. Currency.
Block House	$1 75 @$	75	Westmoreland Co	$8 50	$8 00
Gowrie	1 75	75	Despard Coal Co	8 50	8 00
Lingan	1 75	75	Penn	8 50	8 00
Sydney	2 13½	71½	Newburgh Orrel Gas	8 50	8 00
Pictou	2 13½	1 18½	Delivered in New York.		
Little Glace Bay	1 75	1 00	West Fairmont Gas Coal	....	7 50
Caledonia	1 60	75	Run of Mine	....	7 00

Prices of Foreign Coals.

Duty, $1 25 per ton.

Corrected weekly by PARMELEE Bros., 32 Pine Street, N. Y.

Liverpool Gas Caking	$ 9 50	Liverpool House Cannel	18 00 19 00
" " Cannel	14 00	" " Orrel	16 00 18 00

Per ton 2240 lbs., Ex. ship.

PRICES FROM YARD.

Liverp'l House Orrel, scr'd	$20@23	Liverp'l House Can'l, scr'd	$22 00 25 00

Per ton 2000 lb., delivered.

Coal Freights.

(Corrected Weekly).

Rates of Freight from Newburgh.

RIVER.		EASTERN.	
On "Pittston" Coal, by boats and barges of the Pennsylvania Coal Co., per ton of 2,240 lbs.		Stamford	$1 60
		Norwalk	1 60
Troy and West Troy	$ 55	Bridgeport	1 60
Albany and Greenbush	50	New Haven	1 60
Coeymans	45	New London	1 80
Coxsackie and Stuyvesant	40	Norwich	1 50
Hudson and Catskill	35	Mystic	1 80
Saugerties and Barrytown	35	Stonington	1 85
Rhinebeck and Rondout	30	Sag Harbor	1 85
Po'keepsie and New Paltz Land.	25	Bristol	1 95
Fishkill Landing	20	Newport	1 95
Cold Spring and West Point	30	Fall River	1 95
Peekskill	40	Providence	2 00
Haverstraw	45	Dighton	2 00
Sing Sing and Nyack	50	Warren	2 00
Tarrytown and Piermont	50	Pawtucket	2 20
Yonkers	55	New Bedford	2 10
The coal must be discharged with all reasonable dispatch, at the expense of the consignee, who shall also pay wharfage on the boat. Boatmen will tend guy while unloading.		Boston	3 00
		East Cambridge	3 10
		Salem	3 00
		Newburyport	3 10
		Portsmouth	3 10
		Portland	2 90

Freights on Coal Sea-borne from Port Richmond, Philadelphia.

Nov. 21, 1868.—From Philadelphia and Reading R. R. Wharves, Phila., to

Bangor		3 50	New London	— —	2 70
Boston	— —	3 50	Dover	— —	3 55
Providence		3 00	Cohasset Narrows	— —	3 40
Lynn	and discharging	3 50	Cambridgeport	— —	4 00
Portland		3 50	Dorchester	— —	3 30
Fall River		3 00	Fair Haven	— —	2 75
New Bedford		3 00	Gloucester	3 40	3 50
Salem		3 50	Lawrence	— —	3 40
Newport	— —	3 00	Old Cambridge	— —	3 80
East Cambridge	— —	3 30	Saco	— —	4 10
Newberryport	— —	3 75	Roxbury	— —	3 55
Portsmouth	— —	3 75	Salisbury	— —	3 80
Charleston	— —	2 00	Greenport	— —	2 75
Danversport	and discharging	3 50	Norwich	— —	2 75
Amesbury	— —	3 90	Harlem	— —	1 45
Beverly		3 50	New Rochelle	1 30	1 40
Charlestown		3 50	Sag Harbor	— —	2 75
Hingham		3 35	3 40	Spuyten Duyvel	— —	1 40
Marblehead		3 60	Williamsburg	— —	1 35
Nantucket		3 50	Jersey City	— —	1 80
Plymouth	— —	3 35	New Brunswick	— —	1 20
Provincetown	— —	3 50	Alexandria	— —	1 40
Washington	— —	2 25	Fredericksburg	— —	2 20
Calais	— —	3 30	Wilmington, Del	— —	1 00
Machiasport	— —	3 30	Bath	....	3 70
Hoboken		1 60	East Greenwich		3 ..
Hyannis		3 50	Providence		3 ..
Malden		4	Albany		1 95
Nahant	and discharge	3 20	New York	1 50	@1 60
Weymouth	and towing	3 50	Troy		1 95

From Elizabethport and Port Johnson.

Albany	$1 10	@— —	New London	$1 50	— —
Boston	2 00	— —	Newport	1 75	— —
Bridgeport	1 85	— —	New York	65	— —
Fall River	2 00	— —	Norwalk	1 25	— —
Hartford	2 00	— —	Norwich	1 75	— —
Hudson	1 10	— —	Pawtucket and towing	1 85	— —
Wareham	2 20	— —	Portland	2 00	
Middletown	1 85	— —	Portsmouth	2 00	
New Bedford	2 00	— —	Providence	2 00	— —
Newburyport	2 00	— —	Salem	2 50	— —
New Haven	1 25	— —	Augusta	3 25	— —

Provincial Freights.

TO NEW YORK.		TO BOSTON.	
Sydney	$3 50	Sydney	$2 75
Lingan	....	Lingan	2 25
Cow Bay	4 50	Cow Bay	....
Port Calidonia	4 25	Port Calidonia	3 00
Little Glace Bay	4 00	Little Glace Bay	2 75

Foreign Freights.

New Castle and Ports on Tyne			£18@£15		
Liverpool			12s. 6d.@15s.		ton.
Australian	9 50	@10 00	Lehigh	15 50	@16 00
do. Wallsend	10 00	10 50	Liverpool	13 00	....
Bellingham Bay	11 00	....	Pittston, ton	14 50	15 00
California	7 00	9 00	Scranton	14 00	15 00
Cumberland cks	30 00	32 00	Scotch	13 00	....
do bulk	28 00	....	Vancouver Island	12 50	....
Chili	10 00	....			

Maine.

THE RECENT MINERAL DISCOVERIES.

A correspondent of the Boston *Advertiser* writes: "The following description of the mineral resources of Maine, and of recent interesting and valuable discoveries there, is the result of a summer's visit in the counties between Machias and Eastport, where the pricipal mines are now been developed. This region is spread out like a vast panorama for a distance of ten miles on both sides of the main road leading from Machias to Lubec, and situated in degree of altitude, from level of the sea, to three hundred feet below it—the entire region of country being an upheaval, with here and there special upheavals. A very beautiful and remarkable illustration of this latter class may be seen at 'West Quoddy Head', and to any student of geology is well worth particular attention. There is a perpendicular mass of rock, wedge shape, thrown up an angle of 45 degrees; immense trap walls rest against this on either side, dipping on the one side to the N E., on the other to the S W. The linear course of the upheaval is S H. and N W. and runs directly across the 'Bay of Fundy,' towards the north end of the island of 'Grand Menan.' In the center and along the course of this wedge shaped perpendicular ledge of rocks, there is a beautiful quartz vein about 18 inches in thickness, carrying 18 per cent. of copper in the form of yellow sulphuret. The great force which caused this upheaval, drove the metal into the walls on either side about twelve inches, and nearly in as great quantities as in the vein itself, showing almost conclusively that the mass of metal below is very much greater than at the surface, and showing most convincingly the vein is a true fissure vein and gives assuring promise of becoming very valuable in depth. The vein runs into the shore hills in its N W. course, the height of which is about 200 feet above the waters of the bay. Following the coast line of 'Bailey's Mistake Cove,' there is presented a copper deposit of most extraordinary richness, the ore being black sulphuret and green carburet of copper and horse flesh ore, beside evidences of silver—no richer vein than this can be found anywhere—surface specimens showing 70 per cent. copper. In the village of West Lubec, directly upon the main road running from Lubec to Machias, is a very large vein of white triable quartz, rich in gold, silver, copper and lead. This remarkable mineral lode has been named the 'Ramsdell Lode' from having been first discovered upon the land of Deacon Ramsdell. A shaft is being sunk upon it immediately beside the highway, and from a slight depth of only 25 feet, over 50 tons of rich ore is already obtained, yielding by assay $70 to the ton of gold and silver—besides being rich in copper. This vein from nine feet in width at surface, soon widens out to 15, showing unmistakeable evidences of yielding immense returns in depth. It runs about east and west nearly parallel with the highway for three quarters of a mile—then crossing beneath, it is still traceable until it dips beneath a high range of hills. About a mile from the present shaft, a few years since, a farmer undertook to sink a well. At a depth of seven feet, further progress was impeded by his coming upon a bottom of white rock; discouraged, he filled the hole up; recently the debris having been removed, showing the continuation of the vein known as the Ramsdell which was proved by specimens of the ore yielding the same metals in similar percentage. This vein is situated upon a table land about 600 yards from 'South Bay.' As the tide here rises about 12 feet, it is privileged for vessels of large size, and affords easy means of transportation. Many years ago, a large nugget of gold was found in the waters of this cove, and sold for $2,000. The house and farm purchased with this treasure is pointed out, and the finder is still living near the spot. Where this nugget came from is still a matter of speculation. On the summit of a hill about 250 feet above tide water, on the right of the main road running from Lubec to Machias, is an iron deposit of very rich and valuable ore, and destined soon to attract public attention. In length, this vein has been traced about five miles. It has been tested in depth by shaft 160 feet, the ore increasing in quantity. There are about 2,000 tons of ore piled up on top of the ground, and some of the specimens are of rare beauty and would grace any cabinet in the country. The ore has been pronounced the 'Veritable Elba Ore,' the celebrated mines of which have been worked 2,000 years. There are lumps of it partially crystallized, and without doubt there will be found some of those beautiful crystals so celebrated in the history of those mines. This ore bears so strong resemblance to plumbago as to deceive all, except the mining expert. The mineral resources of this section are truly wonderful. There are several veins of fluor spar, which is an article of import. Immense ledges of porphyry and slate—besides beds of clay of various qualities, some particularly adapted for fire brick. There is one thing this end of the State does not possess, viz: a good hotel. The beautiful and flourishing town of Eastport promises better for the future. The port of Lubec possesses the mere apology for a stage tavern. If you visit Machias and stop at one *tavern*, you wish you had patronized the other—and if you ever stop at the other, you wish you had never visited the place; but the kindness and hospitality of many of the people make amends for these drawbacks."

AMERICAN

Journal of Mining.

WESTERN & COMPANY, Proprietors.

ROSSITER W. RAYMOND, EDITOR.

OFFICE, 37 PARK ROW, NEW YORK.

By publishing contributions, the JOURNAL OF MINING does not necessarily endorse the positions assumed by contributors.

Published Every Saturday Morning.

TERMS.—SUBSCRIPTION, $4 00 per annum, in advance; $2 25 for six months. Single copies, Ten Cents. New York City subscribers are required to pay 50 cents a year extra for delivery. ADVERTISING: Twenty-five cents per line of nine words for each insertion inside, and forty cents outside. Terms invariably cash in advance.

DESIGNING, WOOD ENGRAVING, LITHOGRAPHING and JOB PRINTING

Executed in elegant style, on reasonable terms.

T. P. PEMBERTON is Corresponding and Traveling Editor.

W. B. HARRISON is Editor of the Mechanical Department.

☞ Correspondents, exchanges and others addressing us should be *extremely careful* to write "JOURNAL OF MINING," instead of "MINING JOURNAL," and to give the number of our BOX at the Post Office, which is 5969, to ensure safe carriage. Communications intended for publication should be plainly written, and on one side of the paper only.

NEW YORK, SATURDAY, DECEMBER 26, 1868.

CONTENTS OF THIS NUMBER.

EDITORIALS—The Silver Mines of Norway—A Few Words About the Journal of Mining—Separation of Zinc Blende and Galena—A New Use for Mica—A Rare Opportunity.
ORIGINAL PAPERS.—Report and Explorations in the Gold Fields of Virginia and North Carolina, No. IV—Mineral Resources of the Isthmus of Panama, No. III.
ILLUSTRATIONS.—Improved Steam Stamp-Mill.
MISCELLANY—Gun Cotton for Blasting Purposes—Mint and Mining Statistics—Structure of Metals.
SCIENTIFIC MEETINGS—Lectures before the American Institute—The Primeval Flora.
CORRESPONDENCE.—Plumbago.
MANUFACTURING AND MECHANICAL NOTES—Velocipedes—New Sub-Marine Rock Drill.
MINING SUMMARY.—GOLD & SILVER: California—Colorado—Nevada—Montana—New Jersey—Missouri—Tennessee—Idaho—Dacotah—Canada.—COPPER: Michigan—ZINC: Missouri.—COAL, IRON AND OIL: Montana—Nevada—Mexico.—Colorado—Mexico—British Columbia—Nova Scotia—COAL: England.
REVIEW OF THE IRON TRADE.
THE COAL TRADE.
MINING AND OTHER STOCKS.
METAL MARKET.
SPECIAL NOTICES.
PATENT CLAIMS.

NOTICE TO CORRESPONDENTS.

In consequence of a new regulation recently adopted by the Postmaster of this city to facilitate the early delivery of mail matter, we have to request our correspondents, in addressing us, to give the number of our post-office box, No. 5,969, in lieu of, or in connection with our usiness office addre ss.

THE SILVER MINES OF NORWAY—MIXTURES OF GOLD.

The City of Kongsberg, in Norway, about fifty miles southwest of Christiania, owes its existence to the silver mines of the neighboring mountains. These mines were discovered in 1623, and produced, in the seventeenth and eighteenth centuries about twenty million dollars' worth of silver. During the present century they have been twice in danger of abandonment, but each time they have again recovered, and are yielding at present nearly sixty thousand dollars per annum. There are, perhaps, seventy or seventy-five different mines; but, of course, only a few of them are now in operation. The vein-matter is carbonate of lime, accompanied with asbestos and other minerals, and the silver occurs both native, in threads, network, and sometimes considerable masses, and mineralized, as sulphuret of silver. The workings, in some cases, are twelve hundred feet deep. The native silver found at Kongsberg, like that of our Comstock lode, always contains a little gold, averaging in amount from 0.002 to 3 per cent. On rare occasions very rich mixtures of gold and silver occur. According to a paper recently presented by M. HIORTDAHL to the French Academy, the mixtures analyzed by him, and one other, from an unknown locality, the analysis of which, by FORDYCE, is reported in BROOKE & MILLER'S Mineralogy, are comprised in two classes, the first of which contains from 26.9 to 28 per cent., and the second 45 to 53 per cent., of gold. The fact that many analyses do not give any results between 28 and 45 per cent. is considered to indicate two distinct formulæ for the alloys—which, on that supposition, are not alloys, but chemical combinations. HIORTDAHL'S formulæ are $Au^2 Ag^8$, and Au Ag, the calculated percentage of gold in which would be 47.6 and 26.7 per cent. respectively. The ninety analyses of Electrum, or argentiferous gold, given in DANA'S last edition, are all much richer in gold than this; but their varying proportions do not, in our opinion, give probability to the supposition that the combination is anything more than an alloy, without fixed formula.

The specimens of native silver from Kongsberg have sometimes been magnificent. There is one on exhibition at Copenhagen which weighs 500 pounds; and recently two masses have been extracted from the mines, weighing respectively 238 and 436 pounds. White Piners are requested to take note that they have not got all the rich ore in the world. These lumps of the genuine spoon-metal are a trifle more to the point than even the vaunted chloride! But maybe there is not much of it—in which case, so much the worse for Kongsberg. However, perhaps comparisons would be more in place if White Pine had been, like these Norway mines, producing silver for two centuries and a half.

A FEW WORDS ABOUT THE JOURNAL OF MINING.

A good deal of our space is occupied this week with the index to Volume Six, which closes with the present number. This index is not unprofitable reading. In variety and value of the subjects treated, and in the amount of information communicated, we are not afraid to compare the sixth volume of the AMERICAN JOURNAL OF MINING with any of its predecessors, or with any similar publication in the world. And so, wishing a happy new year to our subscribers—may their numbers continue to multiply!—we go forward with fresh determination and assured confidence into the new volume.

We know that a good many people file the AMERICAN JOURNAL OF MINING, and mean to have the bound volume for future reference. To such let us give a few friendly hints. Don't let your file be broken. If a number does not reach you, write for it instantly, or it may be too late. Our editions are frequently exhausted within three days of publication. For the same reason, do not let your subscription run behind. If we stop your paper, and you lose one or two numbers before resuming, you may never be able to make them up, except at very great cost. It would be a good speculation for you to save your papers carefully, and have them bound, if it were only to sell them in a year or two. Just study the following table, showing the advance in the value of the back volumes of the AMERICAN JOURNAL OF MINING, as they get more scarce.

Volume.	Year.	Subscription.	Binding.	Now Selling at.
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SEPARATION OF ZINC BLENDE AND GALENA.

We are glad to learn that near Camworth, in the Ossipee Valley, New Hampshire, a silver-lead mine is being worked, thus far, with success. Some forty years ago the vein, bearing lead, zinc blende and quartz was opened, but without any beneficial results. Another effort, made some twenty years ago, resulted likewise in failure, principally because it was found impossible to separate the galena with sufficient accuracy from the much larger percentage of zinc blende in the ore. The progress of mechanical invention, however, is likely to give a real value to this long abandoned property. Some three months ago, the Chocorua Silver-Lead Company undertook its development, under very favorable auspices. They have erected a proper building upon the vein, and already 150 or 200 tons of ore have been raised to the surface. At present only half a dozen men are engaged in the underground workings. It is now positively announced that the old difficulty of separating the galena from the zinc blende has been overcome. One of DODGE'S crushers, in connection with a pair of rollers, pulverizes the ore to the proper degree of fineness. By means of elevators it is then carried to one of KROM'S dry ore-concentrators. This machine separates the lead from the zinc and quartz in a surprisingly perfect manner—a fact to which we can bear testimony from an examination of samples now before us. A complete separation of the quartz from the zinc blende is afterwards made in the same manner. Should it prove that this work can be done at a small rate of cost, as seems very probable, this company has a fine prospect before it. We are told that the shaft is now down some sixty or seventy feet, giving indications of a good supply of ore. The great *desideratum* once attained, namely, a means of separating the galena and lead cheaply and effectually, we may expect the dawn of a new era in the development, not only of this, but also of other similar zinc and lead-bearing veins.

A New Use for Mica.

HERR PUSCHER, a technologist of Nuremberg, Bavaria, has discovered that the Siberian mica, which has a peculiarly fine cleavage, can be silvered in the same manner as glass, and employed in the covering of ornaments. The plates of mica are previously cleaned with sulphuric acid. By warming the plates, and afterwards exposing them for a very short time in a muffle at bright red heat, the appearance of "matted silver" is produced. Too long or too severe heating makes the mica brittle, and gives the surface a yellow tinge. The silvery lustre obtained by this process is superior to that of metal in one very important respect. It is not tarnished or altered by sunshine, atmospheric agencies, water, concentrated acids or alkalies.

A RARE OPPORTUNITY.

The celebrated collections of Mining Councillor CREDNER, of Hannover, are announced for sale. They consist of 1,200 specimens of Thuringian rocks, and 500 of North German, Jurassic and Cretaceous fossils. The petrographical specimens are beautifully prepared, all of the same shape and size, about three or four inches square, with neat, straight edges, and provided with labels containing the accurate determination of species and character, by one of the best living authorities, and the name of the locality. This is the best *suite* to be found in the world, illustrating the rocks of that most interesting country to geologists. The fossils are also generically and specifically determined. The price of the collection, packed and delivered in Bremin, is 500 Prussian thalers, or less than $375 in gold. Are there no American institutions that would gladly pay this trifling sum for such a treasure?

Original Papers.

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.]

REPORT OF EXPLORATIONS ON THE GOLD FIELDS OF VIRGINIA AND NORTH CAROLINA.

BY DR. H. CREDNER.

IV.

DESCRIPTION OF INDIVIDUAL MINES, ETC., CONTINUED.

19. *Jenning's Property*, which contains the Laury Mine. It lies one mile south of FISHER'S property, and comprises 130 acres of land. There are three distinct quartz-veins, one of them opened by a shallow prospecting-shaft, on a spot where the vein is twelve feet wide, but poor in gold.

20. *Perkins Mine*, Fluvana Co., three miles from Belzoro Mine. The property includes 180 acres of woodland. A prospecting pit of ten feet depth shows thinly foliated chloritic slate, with an intercalation of sandy quartz, eight inches wide, which carries dark brown oxide of iron and fine particles of gold. The strike is from S S W. to N N E. A perpendicular shaft, thirty feet deep, has been sunk to cut the vein at the stated depth. The ore used to pay the working expenses. The mine has not been worked since 1849. It lies, like the four last mentioned, within six or seven miles of the James Canal, with which it is connected by good roads.

21. *Fisher Mine*, Goochland Co., one and a half miles from Belzoro Mine. There are three old shafts on a lode of tabular sandy quartz, which carries gold, as specimens on the dump show. Engine-house and contents destroyed.

22. *Tellurium Mine*, Fluvana Co., two and a half miles northwest from Belzoro Mine, with an area of 344 acres of land. This property is traversed by several auriferous veins, including: (*a*) "Big Sandy Vein," a quartz vein of three to six feet in width, rich in gold, according to specimens, and opened for two hundred yards by several costeaning pits. It has been but indifferently worked. (*b*) A vein of sandy quartz, eight inches in width, auriferous but not as rich as the Big Sandy. (*c*) "Tellurium vein," ten inches to five feet wide, consisting of sandy quartz, with oxide of iron, iron pyrites, and coatings of tellurium and gold. The layers of talcose slate which alternate with those of the tabular quartz in this vein also carry gold. This vein traverses the property for half a mile. To the depth of about thirty feet it is pretty well worked out. Mr. FISHER, of Belzoro Mine, who first worked this vein, reckoned on a daily income of a hundred dollars for himself and two laborers in the beginning of operations. There are hills of tailings on this property, said to amount to hundreds of thousands of tons, which, according to the testimony of experts, contain gold enough to pay for reworking them.

Besides buildings, the property contains yet the ruined remains of a mill and water works.

Contiguous to this property is Col. BOWLES' farm, which doubtless contains the extensions of the above mentioned veins.

23. *Waller Mine*, Fluvana Co. All tunnels and shafts are destroyed, the dumps overgrown, and particulars of historical account very unreliable. Several specimens lying about indicate the vein to be of sandy quartz, containing oxide of iron and iron-pyrites. Large quantities of tailings lie around the tail-rase of the former mill, which are said to be very rich in gold. The mill itself and all apparatus and machinery are destroyed. The mineral lands are separated into a northeastern and southwestern district, belonging to different owners.

24. *Shannon Hill*, Goochland Co., with an area of 600 acres of land. The vein is as yet only opened by a prospecting pit, since the shaft, which was started to cut the hanging wall, has not been sunk deep enough to reach the vein. This prospecting pit lies 300 yards east of the dwelling-house, and shows the following particulars:

The chief lode is one foot to three feet wide, and is accompanied by two veins of less dimensions, parallel to the foot wall. The strike is S S W. to N N E. and the dip forty degrees to the east. These veins consist of white translucent tabular quartz, with a great deal of earthy oxide of iron and considerable gold. Repeated washings of pulverized quartz-pieces, promiscuously taken up, yielded constantly very favorable results. Trials of this kind, merely undertaken for the purpose of testing the rock, have frequently yielded several dollars. Exceedingly rich specimens, obviously having the particular character of the gangue of this vein, are preserved by the proprietor, and may in this case be relied upon as indicating the richness of the ore. Washing the gold placers on this property yielded as high as eighteen penny-weights of gold for three hands, and averaged eight dollars per day. The vein is not worked out, but merely opened by prospecting pits, an advantage which is not to be overlooked. Wood is abundant, but water, in the immediate neighborhood, scarce.

25. *Walnut Grove Mine*, Louisa Co., ten miles northeast of Shanuon Hill. The vein was discovered in 1845 by GEORGE FISHER, and by him opened. It strikes through grey micaceous slates, which are rich in partly decomposed garnets, and consists of light yellow colored friable quartz, carrying a great deal of auriferous oxide of iron and free gold. It varies in thickness between two and five feet, and is traceable on this property for a considerable distance. Mr. FISHER, of whose reliability we have proof, asserts that he has obtained by the assistance of five hands, with nine stamps, $100 per diem. The shafts are filled up. The mill contains sixteen stamps, two Chilian mills, engine and two boilers, all in a well preserved state. Water is scarce.

26. *Thomasson's Mine*, immediately adjoining the above on the northeast. The vein is the continuation of the former, but widens out to fifteen feet in spots. It consists of friable quartz, with much oxide of iron and iron pyrites and gold. The specimens of ore frequently show free gold to the naked eye. With the help of three hands 30 to 45 dwts. have been the daily yield. Open pits of two hundred feet in length and twenty feet in depth followed the strike of the vein. A shaft, 50 feet deep, is tumbled in. The vein traverses the property for 800 yards.

[WRITTEN FOR THE AMERICAN JOURNAL OF MINING.]

MINERAL RESOURCES OF THE ISTHMUS OF PANAMA.—NO. III.

BY I. BLANCHARD, MINING ENGINEER.

It is evident from what has already been said, that there is little chance of profit in working any of the Isthmus gold deposits, except the quartz veins. We shall now consider, in closing these papers, what are the conditions afforded for the successful working of such veins in this locality.

The Isthmus enjoys a wide and well-deserved reputation for insalubrity. Nowhere is this evil fame more justified than in the districts west of Aspinwall, in Cocle and Veraguas, on the Atlantic slope, where the most numerous and valuable veins are. The atmospheric currents, one from the south, saturated with moisture, and the other cold from the Atlantic, meeting incessantly on the water-shed of the Cordilleras, produce by their reciprocal condensations the torrents of rain which desolate the unhappy slopes (hence Ver-aguas, country of floods); and the vegetation, overstimulated to rank luxuriance by this excessive moisture and the heat of the climate, aids in attracting and precipitating the rains. Most of the Atlantic districts have no well-defined dry season, and several of them none at all. Of course, out of these perpetual floods, together with the gases evolved by the continual decomposition of vegetable matter, much poisonous miasma must arise, adding its injurious effects to those of the hot sun and the floods. Thus it comes to pass, that a portion of the Isthmus is shunned by men. From Aspinwall to Bocas del Toro, and from the mountains to the Atlantic, an area of about 1,200 square miles, there are but a few miserable settlements, supported in wretchedness by the catching of fish and turtle.

The exceptional climate renders the preservation of food and the construction of roads alike almost impossible; timber is very scarce, and spongy trees make the worst possible fuel. From Aspinwall to Bocas del Toro, there is not one real harbor. The coast is dangerous, as the Gulf Stream is very violent, and hurricanes are frequent. Roads on land do not exist, except the official highways; and they exist only on paper! In a country so situated, estimates of the cost of a mining enterprise are necessarily uncertain. Freight is a heavy, but a variable item; labor is scarce, and fluctuates with political changes; the veins themselves are narrow, and cannot be relied upon for a large production of ore, nor for a *uniform* production on any scale. Then all supplies of food, etc., must be brought either on men's backs over the mountains from the Pacific, or by sea, on the Atlantic side. None can be obtained in the country. Finally, delays must frequently be suffered from swollen rivers or a stormy sea. Such are the economical conditions of mining in this region. In spite of their uncertainty, we shall attempt to give an approximate idea of the expenses and profits of the business.

EXTRACTION.

	Meters.
Average width of the vein we will set down at.....	0.25
Width of drift, for two men.....	0.80
Height " " " "	1.40
Monthly progress of " (25 shifts of 10h.).....	2
	Cubic meters.
Total monthly excavation of two men as above.....	2.20
Of which nearly one-third is good ore, or.....	0.70

At a specific gravity of 3, this gives a weight of 2.10 kilogrammes, or two tons of ore. If the vein be worked simultaneously at fifteen points (more are scarcely possible) the monthly yield will be 30 tons as the work of 30 men, besides outside laborers and assistants, carpenters, etc. The number of the latter being estimated at 20 and their wages at about 80 cents per day, while the miners get $1 50 (food included), we have a monthly expense of $1,830, increased by medical attendance, clothing and interest on the capital employed in bringing laborers to and from the mines, to at least $2,000. The ore thus obtained may be either worked at the mine, or conveyed to metallurgical works.

TRANSPORTATION OF ORE TO EUROPE OR THE UNITED STATES.

A brief calculation would show that the expense of freight will be far too heavy, unless the ore has previously been stamped and concentrated. Of course it is not easy to give an exact estimate of the stamping cost; but it would be rather high as compared with California. Hauling is cheap, but fuel dear. In the concentration there is a loss, of course. Then the expense of maintaining a road to the sea, procuring a vessel for transportation, shipping, storage, commissions and final sales to some metallurgical establishment, finish the list of transactions. All these expenses must be defrayed out of the net value of the ore, after mining cost is subtracted, or about $133 per ton Transportation from the mines to the sea is also difficult on account of the rivers, which present everyhere a series of rapids, and are liable to sudden floods and droughts.

WORKING ORES AT THE MINES.

The prospects under this system would not be much more favorable. The bad fuel, scarcity of material for construction and lack of roads by which to obtain supplies, make stamping costly; and the treatment of the stamped ore presents an embarrassing question. Smelting is out of the question. Amalgamation is useless.

On the southern side of the Isthmus labor and fuel are much cheaper, the country is accessible and cultivated; but these advantages are annulled, as we have seen, by the smaller value of the ore, narrowness and irregularity of veins, and scarcity of timber, fuel and water-power. Under these circumstances, therefore, there is scarcely a chance of working the gold deposits of the Isthmus at a profit, and hence they cannot be objects of attention to American adventurers, even leaving out of view the far greater and more enticing advantages of the Pacific States and Territories of the Union.

Correspondence.

[To insure insertion of correspondence in our columns, the full name and address of the writer must be given.]

Plumbago.

NEW YORK, December 7, 1868.

EDITOR AMERICAN JOURNAL OF MINING:

To add to the information which Dr. LEWIS FEUCHTWANGER communicated to your JOURNAL, I send you this day two reports upon plumbago properties situated in Buckingham, Canada East, which properties have been opened during the present summer under my directions, and from which I have at my office specimens of from 500 to 700 pounds, which are open for the inspection of any one interested. It is a well established fact that the product from the mines in operation at Lochaber, owned and worked by gentlemen of New York and Springfield; and that of the Canada, in Buckingham, C. E., owned and worked by capitalists in Montreal, has been readily purchased and used by some of the best crucible makers, and found to be equal in every respect to the Ceylon. My researches for the last ten or twelve years has been principally investigating the plumbago deposits on this continent, and so far as my experience leads me to believe, in that particular section of the country are not only to be found the greatest deposits of this mineral, but the purest and best adapted for crucibles after Ceylon. Ceylon, Germany and Ticonderoga are not, as the Dr. says, the sole localities that furnish the material for crucibles.

JOHN L. HALL, M. C. C.

Scientific Meetings.

LECTURES BEFORE THE AMERICAN INSTITUTE

THE PRIMEVAL FLORA.

The fourth of these lectures before the American Institute was given at Steinway Hall on the evening of Dec. 23, by Prof. DAWSON of McGill College, Montreal, the subject being "The Primeval Flora." The professor opened his discourse by saying he should have to deal principally with past time, and he should have to make large demands upon the faith of his audience, with regard to the extent of this time. It was to primeval forests that he would try to carry them, and in magination awaken slumbering ages, and make those forests green in their eyes and vocal in their ears. They would thus find themselves in a new world, different from that which we inhabit, and differently peopled. First, he would say a few words on the relation of Primeval Flora to existing plants; next he would say something of its relation in a general way to the school of geological times. Then he would enter on the subject proper by describing some of the most remarkable plants that flourished in primeval times. For the benefit of those of the audience who might not have very deeply studied modern botany he should say a few words about the classification of existing plants and the relation of the fossil to them. We would find that they might be divided into two great series—first, that series of plants in which we have distinct flowers and fruit, containing seeds proper. These were the highest plants or the *phenograms* of the botanist. We have minor plants, of lower organization, which, instead of producing seeds, produced microscopic seeds which are called *sphors*. The whole vegetable kingdom consists not of all the plants that are now on the earth alone, but of all the plants that ever were on the earth. The primitive flora might include representatives of all the groups he had been speaking about, and it might include only the representatives of some of them. If we went back to these early geological periods we should find that the fossil plants were not exogens or endogens, but a great many of them belonged to the highest group of the crypogramous plants. The only climates in the present world which nearly approached in their flora to that of the primeval time were the climates of the southern hemisphere. If we compared some of those plants with modern ferns we would find they more resembled such as might be gathered in the New Hebrides or New Zealand or along the Pacific, and they were very like our modern ferns. We might split up tons of coal shales and find the roots of these. The ferns had a good deal to do with making coal forests. They had still another group of trees—namely, pines. Our pines and spruces and larches are represented in the coal formation period. Now the pines of the coal formation appeared to have been composed of wood very much of the same texture as our modern pine, and we find part of the trunks of these pines preserved fossil in the coal formation. The pines are distributed throughout the modern world as well as they were in bygone geological periods. The lecturer then went into a deep and learned discussion on his subject, pointing out how little was yet really known of the great world of geological nature, and concluding amidst hearty applause.

Structure of Metals.

At a recent meeting of the Liverpool Polytechnic Society, the secretary read a paper. "On the Structure of Metals," by Mr. W. Vivian, of the Mwyndy Iron Mines, Llantrissant, Glamorganshire. Mr. Vivian introduced his subject by stating that, although the malleability, tenacity, and durability of metals have been much experimented upon, yet the minute condition of the structure on which these proporties seem to depend have been very much overlooked. He considered that all metals might be divided into two leading divisions, according to the character of their minute structure—namely, the angular or crystalline, and the cellular or porous, and he invited the attention of the society to the appearances presented by each of these under the microscope. The best known conductors of heat and electricity are silver, copper and iron metals, in which the cellular system is most highly developed, and their several capacities for conduction are in the direct ratio of the perfection of their cell system. Mr. Vivian stated that the "fibre" or "silky lustre" exhibited in the fracture of good iron is only the effect of the light reflected from inner surfaces of myriads of minute cells exposed by the fracture, that the form of these, in their normal state, is spherical, or nearly so, but become changed in the process of rolling, etc. Air has no access to these cells in their concealed state, but when they are exposed to the action of the atmosphere they soon become tarnished. The cellular construction is not an accidental occurrence, but is the proper constitution of the metal, and appears to take place under the combined effects of heat—the repellent force, and the cohesive force inherent in the substance. The mechanical properties of tenacity, ductility, etc., must greatly depend on the perfection of the cell system, and as much importance should be attached to this as to the degree of chemical purity necessary to ensure a good iron, since it is well known that from iron of the same chemical purity various qualities of metal may be produced by working at an improper temperature, or by cooling too suddenly.

A crystalline malleable iron does not show prisms in its fracture, but simply a number of faces or planes crossing the cells at right angles, cutting them off short. The process of rolling iron into plates or sheets does not obliterate these cells, but merely modifies them, as they widen out under the pressure; the thin partitions become laminated, and on the regularity of this lamination the quality of the plate very much depends. The cell system of copper is more perfect than that of iron, a result of the pouring of the copper into moulds, but the cells are afterwards altered by the pressure in rolling, etc., but never destroyed. If it were possible to make a section one-millionth part of an inch in thickness these cells would be seen.

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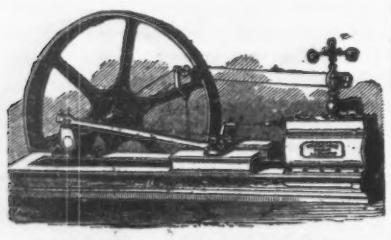

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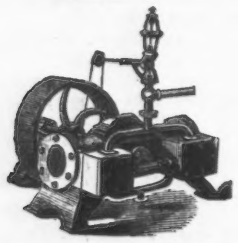

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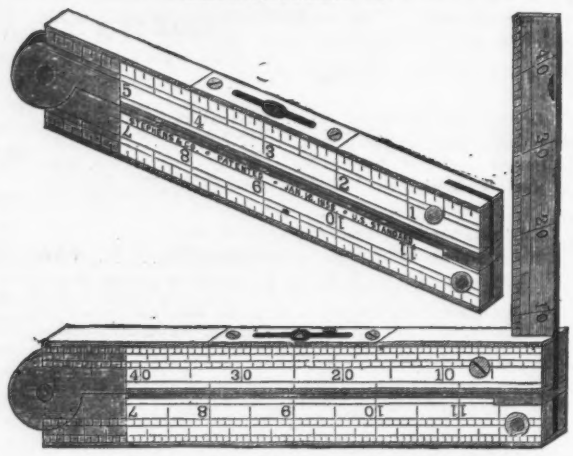

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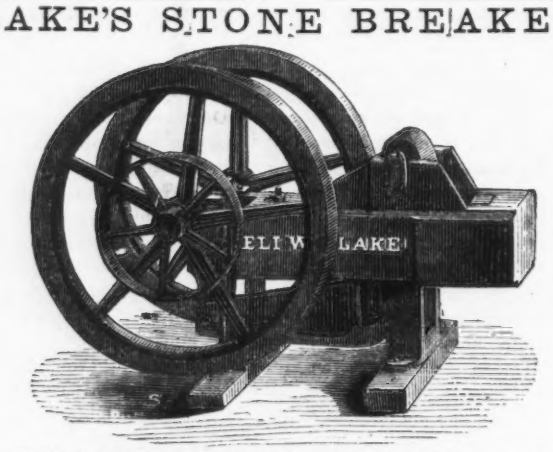

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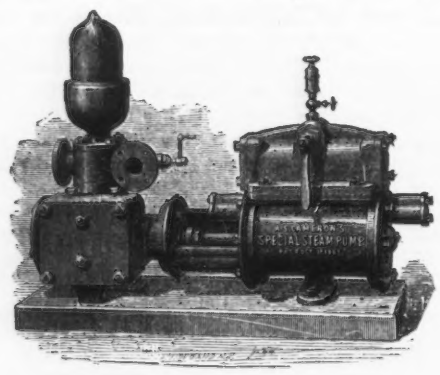

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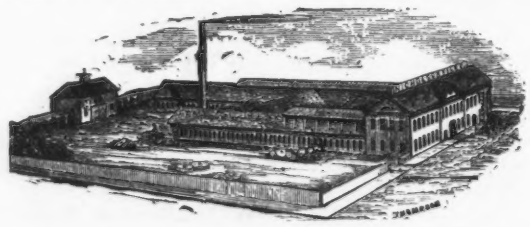

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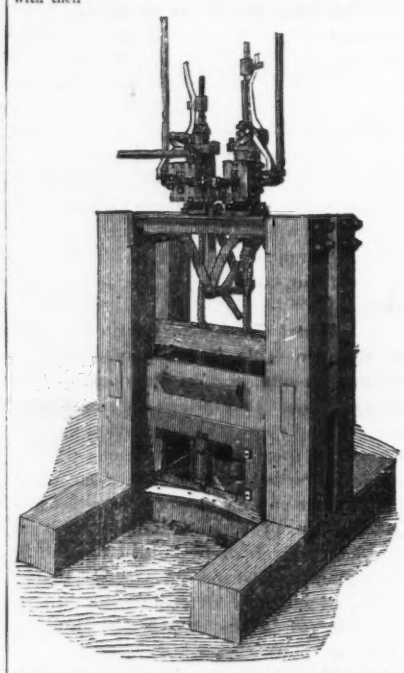

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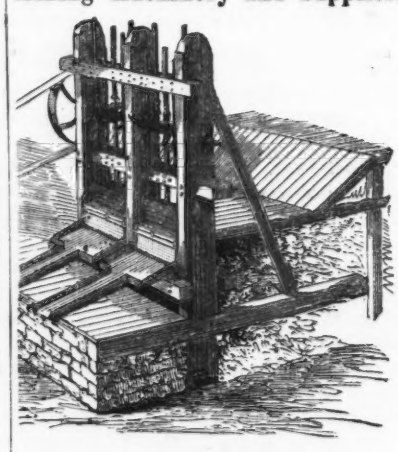

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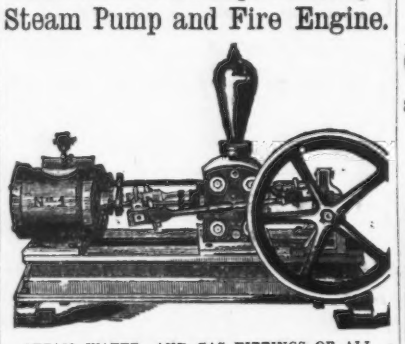

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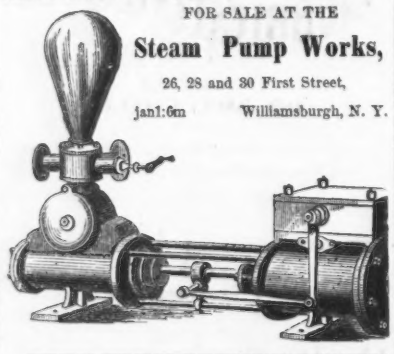

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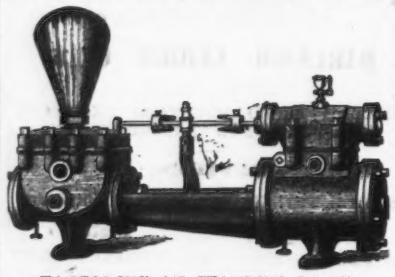

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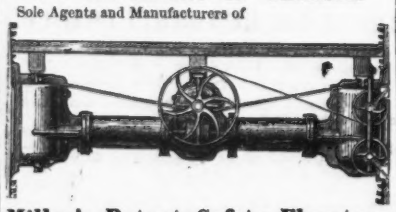

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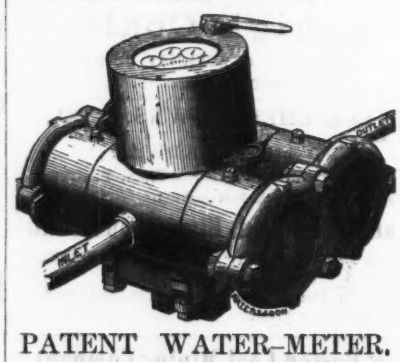

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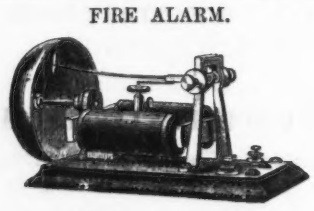

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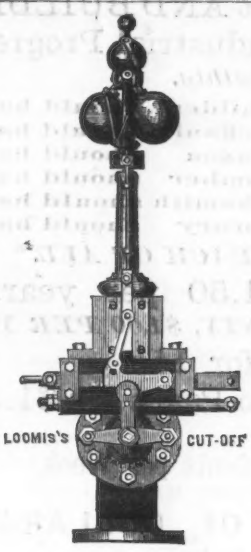

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